FDQ - Qualification Specification

FDQ number	Qualification title	EPA Plan number	EQF Level	Qualification Number (QN)
701-368	FDQ Level 3 End-point Assessment for Food and Drink Maintenance Engineer	ST0195/V1.1	4	610/3092/2

Qualification objective

This End-point Assessment (EPA) qualification is designed for learners who have completed the on-programme training for the Food & Drink Maintenance Engineer standard apprenticeship. Successful completion of this EPA confers the correct level of knowledge, skills and behaviours specified in the apprenticeship standard, and contributes towards the achievement of the Level 3 Food & Drink Maintenance Engineer apprenticeship. FDQ provides an EPA statement of results but certification of the complete apprenticeship standard is provided by the Education and Skills Funding Agency (ESFA).

Regulation

The EPA qualification is externally quality assured by Ofqual.

Entry Requirements

Learners need to be 16 years old or over to take this qualification, employed or contracted in a workplace and enrolled on the Food & Drink Maintenance Engineer standard apprenticeship.

Prior to taking this EPA qualification, entrants should meet the Level 3 Food & Drink Maintenance Engineer gateway requirements as specified in the assessment plan:

- On and off the job training to develop knowledge, skills and behaviours as specified in the apprenticeship standard

- English and Maths qualifications in line with apprenticeship funding rules*
- A declaration form that confirms all knowledge, skills and behaviours in the Food & Drink Maintenance Engineer Standard have been evidenced.
- A certificate of completion for a Level 3 Diploma in Food & Drink Engineering Maintenance
- A portfolio of evidence, to be underpin the Interview component.

*For those with an education, health and care plan or a legacy statement, the apprenticeship's English and mathematics minimum requirement is Entry Level 3. British Sign Language (BSL) qualifications are an alternative to English qualifications for those who have BSL as their primary language.

Qualification Content

This End-point Assessment qualification tests the mandatory knowledge, skills and behaviours set out in the Food & Drink Maintenance Engineer standard including: core knowledge of maintenance approaches and techniques; operation of mechanical equipment in the food & drink industry; how to produce replacement components; performing routine first line mechanical maintenance. Apprentices will have a solid grounding in most aspects of food and drink production and the required maintenance activities expected as an engineer.

Entrants will undergo three test components as detailed on the following pages, which must all be passed to achieve the apprenticeship. The apprentice is awarded a final grade of fail, pass, merit or distinction.

This qualification could lead to

This qualification will support progression to further learning in:

1. Subject areas including:

    - Food safety and quality
    - Team leading/management
    - Engineering procurement
    - Continuous improvement

2. Further qualifications and apprenticeships including:

- Level 4/5 Leadership and management
- Level 6 Food and Drink Advanced Engineer (integrated degree)

Qualification support

The Level 3 Food & Drink Maintenance Engineer standard and assessment plan has been developed by the Food & Drink Maintenance Engineer apprenticeship employer group and approved by the Institute for Apprenticeships and technical Education (IfATE); Ofqual carries out external quality assurance of the EPA. The FDQ EPA qualification is supported by the Food and Drink Training and Education Council and a range of employers and training providers.

Fitness for Purpose

FDQ has in place a comprehensive quality system built to ensure its EPA qualification assessments are valid and fair. Built on validity principles - reliability, comparability, manageability, minimising bias, moderation and fairness - our policies, procedures and operational practice including assessment development and maintenance, Internal Quality Assurance and Moderation ensure our EPA qualifications are developed, delivered and remain fit for purpose.

Further information

Further information can be obtained from our website at: http://www.fdq.org.uk

Or by contacting FDQ:

Tel: 0113 859 1266

E mail: fdq@fdq.org.uk

Methods of Assessment

The qualification includes 3 assessment components, each of which must achieve a pass in order to pass the end-point assessment requirement of the Level 3 Food & Drink Maintenance Engineer apprenticeship. Specifications for each of the assessment components are available on FDQ's secure system FDQAwards. Please contact FDQ's EPA team at epa@fdq.org.uk for more information.

Overall grading of the EPA qualification is fail, pass, merit or distinction, which is calculated from the combination of grades achieved in each of the three component assessments.

The three assessments may be undertaken in any order within the typical three-month gateway period and assessment on each may be undertaken by different independent examiners.

Assessment Instruments and Time Allowed

Level 3 EPA for Food & Drink Maintenance Engineer ST0195 V1.1 Assessment Instruments and possible grades	
Instrument	Possible grades
Observation with questions (OQ)	Fail/pass/distinction
Interview underpinned by portfolio of evidence (IPE)	Fail/pass/distinction
Written Knowledge Test (WKT)	Fail/pass
Multiple-choice Test (MCT)	Fail/pass
Overall EPA grading	Fail/pass/merit/distinction

Test structure		Time allowed
OQ	Naturally occurring observation with a minimum of 5 open questions.	4 hrs – 4hrs 24 mins
IPE	Minimum of 12 open questions based on portfolio of evidence	90-99 mins
WKT	15 long response questions requiring approximately 100 words per answer	120 mins
MCT	40 multiple choice questions, with 1 mark awarded for each correct answer.	60 mins

Qualification scope

The qualification will assess the following knowledge, skills and behaviours:

		Assessment Method			
Standard Ref	Core Knowledge to be assessed	OQ	IPE	WKT	MCT
K1	Food and drink sector awareness. The industry's regulator: The Food Standards Agency. Types of organisations: branded and non-branded, and high and low care sites. Types of food and drink products: ambient, frozen, fresh, chilled, confectionery, and liquid. End-to-end supply chain. Customers and consumers. Customer specifications: purpose and consequences of non-compliance. Implications of product shelf life.				•
K2	Food and drink maintenance engineer's role. Limits of autonomy. Different teams and functions involved in production. Business operation considerations: efficiency, customer satisfaction, competitiveness, minimising risks to production, and ethical practices.		•		
K3	Principles of quality management systems and processes in the food and drink industry and impact on customer requirements. Customer and food trade association standards for example, British Retail Consortium, Retailer standards. Internal and external audits and impact on maintenance.				•
K4	Food science and technology - fundamentals of how engineering is used in food and drink production: aseptic filling and processing, chilling, freezing, heat processing, modified atmosphere packaging (MAP), preservation, and packaging.				•
K5	Food safety regulations awareness and their impact on food and drink engineering: Food Safety Act, Hazard Analysis and Critical Control Points (HACCP), Threat Analysis of Critical Control			•	

	Points (TACCP), and Vulnerability Assessment of Critical Control Points (VACCP).				
K6	Food safety: control of contamination hazards (microbiological, physical, and chemical). The risk of contamination and impact on product integrity and health of consumers. Allergens. The importance and impact of temperature and process control measures. Regulatory information and date code responsibilities. Hygienic engineering design of food premises and equipment, and hygiene requirements of operators. Cleaning and disinfection principles, procedures, and methods: Cleaning in place (CIP), cleaning out of place, and chemical impact. Pest control.				•
K7	Properties of food and drink, packaging materials and sealing techniques and impact on engineering tasks.			•	
K8	Health and safety regulations awareness and their application to food and drink engineering: Health and Safety at Work Act, Control of Substances Hazardous to Health (CoSHH), Working in confined spaces, Working at Height, Lone working, Provision of Work Equipment Regulations (PUWER), Lifting Operations and Lifting Equipment Regulations (LOLER), Dangerous Substances and Explosive Atmospheres (DSEAR), Pressure Equipment Directive (PED), Electricity at work regulations, Noise regulation, L8 Legionella, Display Screen Equipment, The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR), and Construction Design Management regulations. Slips trips and falls. Types of incidents: fire, accidents, and near-misses. Mitigation methods. Incident management. Near miss reporting.				•
K9	Health and safety practice: risk assessments and method statements, manual handling, Personal Protective Equipment (PPE), and signage and barriers.	•			

K10	Safe isolation of process fluids, gases, electricity, and stored energy: Lockout, tagout (LOTO).	•			
K11	Environmental regulations and requirements awareness and their application to food and drink engineering. Environmental Protection Act. Sustainability. Waste Electrical and Electronic Equipment Directive (WEEE). Hazardous waste regulations. Waste management. Recyclable materials and waste disposal procedures. Energy monitoring. Data logging to optimise energy performance. The Climate Change Agreements. Carbon Reduction Commitment (CRC). Renewable and alternative energy sources. Energy reduction. Types of pollution and control measures: noise, smells, spills, and waste. Efficient use of resources. Environmental permits.				•
K12	Types of food and drink equipment and their application: pumps, valves, gauges, temperature controls, mixers, conveyors, depositors, sealers, safety systems, pressure systems and transmitters, human machine interface, and handheld devices. The importance of set points.			•	
K13	Spares and services considerations: availability, stock lead times, correct handling, the identification of equipment and parts, function and specification of parts, spares, and components, stock value, faulty stock, returns, salvageability of parts to be removed.			•	
K14	Maintenance tools: selection, correct use, maintenance, storage requirements. Restrictions in food and drink industry and designated areas.	•			
K15	Engineering standards and regulations awareness and their application to food and drink engineering: British Standards (BS), International Organisation for Standardisation standards (ISO), European Norm (EN), and Atmospheres and Explosives (ATEX). Manufacturers' manuals: what they are and how to use them.				•

K16	Standard operating and quality assurance procedures (SOP): what they are and how to use them.	•			
K17	British standards for engineering representations, drawings, and graphical information.		•		
K18	Engineering mathematical and scientific principles: calculations, conversions, and equipment sizing and dimensions.			•	
K19	Engineering materials and their properties: impact on use in a food environment (food safe).			•	
K20	Maintenance strategies and best practice: run to failure (breakdown maintenance), preventive (scheduled) maintenance, Predictive Maintenance (PdM), and Reliability Centered Maintenance (RCM).			•	
K21	Reliability techniques - critical tools: condition monitoring, oil sampling, thermography, vibration analysis, and ultrasound. How they are used to reduce breakdowns, failures, and operational losses.		•		
K22	Food safety engineering: food grade oils, greases, cleaning fluids, and safe use of tools and equipment.	•			
K23	Equipment performance measures: data and how to use it. Terminology: mean time between failure, and overall equipment effectiveness (availability).			•	
K24	Mechanical principles. Types of mechanical drives, belts, chains, and gears: alignment, and how to identify wear. Types of bearings: application, alignment, and fit.			•	
K25	Principles of down-hand (flat) TIG (Tungsten Inert Gas) welding techniques in food environment: butt and tee. Awareness of MMA (Manual Metal Arc) and MIG (Metal Inert Gas) welding practices and when they need to be used.		•		

K26	Component manufacturing uses and requirements. Turning and milling, grinding, drilling, bench fitting techniques. Preparation for the food and drink environment. Threads, fit, finish, joining techniques, measurement and tolerance, and material selection considerations.		•		
K27	Pneumatic and hydraulic system principles: transfer of energy inside fluid power systems in the food and drink industry.			•	
K28	Basic engineering theory and thermodynamic principles on heat transfer used in the food and drink industry: how it works and maintenance requirements.			•	
K29	Electrical principles. Basic electrical theory: LV (Low Voltage), HV (High Voltage), current, resistance, symbols and terminology. Electrical first aid. Alternating current (AC) and direct current (DC) systems. Testing equipment. Electrical circuit theory, electrical machines, electrical safety systems, and smart solutions.			•	
K30	Control circuits principles. Basic components (switches, relays, contactors, overloads, circuit breakers), power supplies, and calibration.			•	
K31	Safety circuits: safety system categories, safety system architecture and components, characteristics of safety system components. What they do and why they are important (legality and performance).			•	
K32	Types of motors and control systems and how they work: mechanical and electrical properties, programming of variable speed drives and parameters, soft starts.			•	
K33	Electrical instrumentation and control installation, commissioning and decommissioning practices and techniques to standards required for food and drink industry. Ingress Protection (IP) and ATEX ratings. Testing and fault finding approved instrument requirements. Arc flash protection requirements.		•		

K34	Automation. Instrumentation and calibration techniques for systems: thermo, weights, and flow. Robotics and data acquisition (SCADA) and smart network systems. Communication systems: Profinet, Ethernet, Profibus, CANopen, and DeviceNet.				•
K35	Types of Programmable Logic Controllers (PLC). How they work, system maintenance and architecture. Digital, analogue inputs, outputs, and IOT. Hardware interface and field wiring.				•
K36	Sensors and motion control. Types of sensors and how they work: digital, analogue, pressure level, probes, inductive and smart. Encoders and position control: selection procedures.				•
K37	Awareness of services and utilities in the context of food safety importance and impact: water supply and systems, boiler control, electrical distribution system, air compressors, steam boilers, refrigeration system, building management, ventilation and air conditioning (HVAC) controls, access control systems, effluent and waste, and chilled water systems.				•
K38	Principles of factory digitalisation (Industry 4.0).				•
K38	Problem solving techniques: root cause analysis, 6 thinking hats, DMAIC (Define, Measure, Analyse, Improve, Control), and PDCA (Plan Do Check Act).		•		
K40	Fault finding techniques: root cause analysis, 5 Whys, fishbone, and half-split. Diagnostic tools and equipment.		•		
K41	Continuous improvement techniques: lean, 6-sigma, KAIZEN, 5S (Sort, set, shine, standardise and sustain), and SMED (Single-Minute Exchange of Dies).		•		
K42	Information technology: Management Information Systems (MIS), spreadsheets, presentation, word processing, email, virtual communication and learning platforms. General		•		

	Data Protection Regulation (GDPR). Cyber security requirements.				
K43	Maintenance work recording and documentation requirements.	•			
K44	Organisation techniques: planning, time management, workflow, and work scheduling and prioritisation.	•			
K45	Communication techniques: verbal, written, and electronic. Adapting style to audience. Engineering terminology.	•			
K46	Report writing techniques.		•		
K47	Team working techniques: how to work as part of a team, understanding the importance of establishing and meeting the requirements of different roles.		•		
K48	Workplace training and buddying techniques: how to pass on knowledge and skills to others.		•		
K49	Equality, diversity, and inclusion in the workplace: what it means and why it is important.		•		
Standard Ref	Core Skills to be assessed	OQ	IPE	WKT	MCT
S1	Read and interpret task related information and data. For example, work instructions, SOPs, quality control documentation, Service Level Agreements, specifications, engineering representations, drawings, and graphical information, work instructions, and operation manuals.	•			
S2	Plan work. Identify and organise resources to complete tasks.	•			
S3	Identify hazards and control measures to mitigate risks.	•			
S4	Comply with food safety regulations and procedures.	•			

S5	Comply with health and safety regulations and procedures.	•			
S6	Comply with environment and sustainability regulations and procedures: safe disposal of waste, re-cycling or re-use of materials and efficient use of resources.	•			
S7	Select, check the condition, and safely use maintenance tools and equipment. Store tools and equipment. Complete or arrange maintenance of tools and equipment including calibration where required.	•			
S8	Follow standard operating procedures and quality procedures.	•			
S9	Follow site isolation and lock off procedures (lockout, tagout) and re-instatement of equipment with system checks and handover.	•			
S10	Apply mechanical and fluid power system maintenance practices and techniques. For example, check levels, parts wear, pressure, and sensors, grease and lubricate parts, replace, fit components, and calibrate equipment.	•			
S11	Apply electrical and control maintenance practices and techniques including use of electrical testing equipment and instruments. For example, panel risk assessment, fixed wire installation testing, fault finding, thermographic surveys, and checking protection settings.	•			
S12	Apply reliability engineering techniques to prevent or reduce the likelihood or frequency of failures. For example, condition monitoring, oil sampling, thermography, vibration analysis, and ultrasound.		•		
S13	Install and configure instrumentation or process control systems.		•		
S14	Install and configure electrical systems. For example, add distribution boards to circuits, single and three phase motors (AC and DC).		•		
S15	Assemble, position and fix equipment or components. Complete commissioning checks.		•		

S16	Disconnect and remove equipment or components. Complete storage measures to prevent deterioration.		•		
S17	Read and interpret equipment performance data.			•	
S18	Fabricate, drill, and join to produce basic parts, spares or components to measurement and tolerance specification.		•		
S19	Apply down-hand (flat) TIG welding techniques: butt and tee.		•		
S20	Apply mathematical techniques to solve engineering problems.			•	
S21	Produce and amend electrical and mechanical engineering representations, drawings, and graphical information. For example, for new component parts or change in circuit diagram or panel.		•		
S22	Apply fault-finding and problem-solving techniques for example, using PLC data to diagnose issues and locate faults on industrial network.		•		
S23	Apply continuous improvement techniques to understand current performance; collect and record data. Devise suggestions for improvement.		•		
S24	Restore the work area on completion of activity.	•			
S25	Resolve or escalate issues.	•			
S26	Use information technology. For example, for document creation, communication, and information management. Comply with GDPR. Comply with cyber security.		•		
S27	Record work activity. For example, asset management records, work sheets, checklists, waste environmental records, and any business or legal reporting requirements.	•			
S28	Communicate verbal and written. For example, with colleagues and stakeholders. Use engineering terminology where appropriate.	•			

S29	Produce reports for example, equipment performance reports.		•		
S30	Provide guidance or training to colleagues or stakeholders.		•		
Standard Ref	Core Behaviours to be assessed	OQ	IPE	WKT	MCT
B1	Prioritise health and safety, food safety, and the environment and sustainability.	•			
B2	Promote health and safety, food safety, and the environment and sustainability.		•		
B3	Take ownership for own work and accountability for quality of work.	•			
B4	Apply a professional approach.	•			
B5	Team-focus to meet work goals: respectful to others, builds relationship with others, and positive inclusion.		•		
B6	Respond and adapt to work demands.		•		
B7	Committed to Continued Professional Development (CPD) to maintain and enhance their competence.		•		

Grading Criteria

The three assessment components are assessed using the grading criteria on the following pages.

OQ Grading Criteria

L3 EPA for Food & Drink Maintenance Engineer V1.1 Observation with questions Grading Criteria		
Theme KSBs	Pass descriptors In order to achieve a pass, apprentices must demonstrate all of the pass descriptors	Distinction descriptors In order to achieve a distinction, apprentices must demonstrate all the pass descriptors and all the distinction descriptors
Task information S1	Reads and interprets written information and data correctly to plan and complete tasks - for example, engineering representations, drawings, and graphical information. (S1)	None
Organisation K44 S2	Plans work and identifies and organises resources to complete tasks using organisational techniques. (K44, S2)	Planning achieves efficiencies in the use of resources and mitigates against potential issues. (K44, S2)
Work environment K9 S3 S4 S5 S6 S24 B1	Identifies hazards and implements control measures in-line with company procedures. Conducts work in line with food safety, and health and safety regulations and company procedures. (K9, S3, S4, S5)	Explains the importance of compliance with health and safety practice with reference to the impact on individuals and the workplace. (K9) Justifies how the applied control measure(s) minimise risks compared to others. (S3)

	Conducts work in line with environment and sustainability regulations and procedures, including safe disposal of waste, recycling or re-use of materials and efficient use of resources. Prioritises health and safety, food safety, and the environment and sustainability over other factors for example time and cost. (S6, B1) Restores work area on completion of the activity. (S24)	
Tools and equipment K14 S7	Selects maintenance tools appropriate for the task. Checks the condition of tools and equipment ensuring they are safe for use. Completes or arranges maintenance of tools and equipment including calibration where required. Uses maintenance tools and equipment safely in line with their employer's or manufacturers' instructions and in line with restrictions in the food and drink industry and designated areas. Stores tools and equipment on completion of work. (K14, S7)	Explains the importance of undertaking pre-checks of maintenance tools and equipment in line with their employer's or manufacturers' requirements. (K14, S7)

Procedures K16 S8 S25 B3	Takes responsibility to complete work within limits of authority in compliance with company standard operating and quality procedures, identifying and resolving issues or escalating issues outside of limits of authority in line with company procedures. (K16, S8, S25, B3)	Explains the importance of completing tasks in line with standard maintenance procedures. (K16, S8)
Maintenance K10 K22 S9 S10 S11	Follows site isolation and lock off procedures (lockout, tagout), system checks, and handover to safely re-instate equipment. (K10, S9) Applies mechanical, fluid power system, and electrical maintenance practices and techniques in line with food safety engineering requirements to meet task requirements. (K22, S10, S11)	Ways of working achieves task efficiencies or effectiveness; for example, mitigates against potential errors (right first time), high quality finish, completes additional measures to add value. (S10, S11)
Communication K45 S28 B4	Applies a professional approach using verbal and written communication techniques suitable for the context, adapting style and use of terminology to suit the audience. Uses sector and industry terminology correctly. (K45, S28, B4)	None
Documentation K43 S27	Completes work records required for tasks correctly, legibly and in full. (K43, S27)	None
Fail: apprentices will fail if they do not demonstrate all the pass descriptors		

IPE Grading Criteria

L3 EPA for Food & Drink Maintenance Engineer V1.1 Interview underpinned by Portfolio of Evidence Grading Criteria		
Theme KSBs	Pass Apprentices must demonstrate all the pass descriptors	Distinction Apprentices must demonstrate all the pass descriptors and all of the distinction descriptors
Food and drink maintenance engineer's role K2	Explains their role identifying: • limits of autonomy • different teams and functions • business operation considerations (K2)	None
Reliability techniques K21 S12	Describes how they have applied reliability engineering techniques to prevent or reduce the frequency of breakdowns, failures, and operational losses in line with company procedures. (K21, S12	Justifies why the applied reliability technique(s) was correct for the task compared to another. (K21, S12)
Component manufacture K26 S18	Describes how they have fabricated, drilled, and joined to produce basic parts, spares, or components in line with measurement and tolerance specification. (K26, S18)	None
Welding	Describes how they have applied down-hand (flat) TIG welding	None

K25 S19	techniques. Explains when MMA and MIG approaches may be required. (K25, S19)	
Problem solving and fault-finding K39 K40 S22	Describes how they have applied fault-finding and problem-solving techniques to diagnose and resolve, or escalate problems or issues, in line with company procedures. (K39, K40, S22)	Explains the value of specific fault-finding and problem-solving techniques they have used for different issues. K39, K40, S22)
Continuous improvement K41 S23 B2	Describes how they have applied continuous improvement techniques and devised suggestions for improvement for the benefit of the organisation, customer, or work process, which also promote health and safety, food safety or the environment and sustainability. (K41, S23, B2)	Evaluates the actual or potential value of a specific improvement suggestion. (K41, S23)
Installation, commission checks, and decommission K33 S13 S14 S15 S16	Describes how they have installed and configured instrumentation or process control systems and electrical systems in line with standards required for food and drink industry, regulations and requirements. (K33, S13, S14) Describes how they have applied practices and techniques to	Explains the importance of completing installation in line with standards required for food and drink industry, regulations and requirements. (K33)

	assemble, position, and fix equipment or components and complete commissioning checks for food and drink or packaging equipment in a food safe environment. (S15) Describes how they applied practices and techniques to disconnect and remove equipment or components and complete storage measures to prevent deterioration. (S16)	
Engineering representations, drawings, and graphical information K17 S21	Describes how they have produced and amended electrical and mechanical engineering representations, drawings, and graphical information to British standards. (K17, S21)	None
Report writing K46 S29	Outlines different reports they have produced, and describes techniques applied to ensure suitability for audience. (K46, S29)	None
Information technology K42 S26	Describes how they have used information technology for different purposes (such as, MIS, spreadsheets, presentation, word processing, email, virtual communication, and learning	None

	platforms), explaining how they comply with general data protection regulations (GDPR) and cyber security. (K42, S26)	
Team working K47 K49 B5 B6	Describes how they have applied team working techniques to achieve work goals taking account of equality, diversity, and inclusion. Describes how they have responded and adapted to meet work demands. (K47, K49, B5, B6)	None
Training and development K48 S30 B7	Describes how they have provided guidance or training to colleagues or stakeholders using different techniques to meet the identified need. (K48, S30) Describes CPD they have undertaken and future plans for CPD to enhance competence. Explains what the impact of their CPD has been and how it has benefited others and the business. (B7)	None
Fail: apprentices will fail if they do not demonstrate all the pass descriptors		

WKT Grading Criteria

L3 EPA for Food & Drink Maintenance Engineer V1.1 Written Knowledge Test Grading Criteria		
KSB	Descriptor	Pass descriptor
K5	Food safety regulations	Awareness of food safety regulation(s) and their impact on food and drink engineering: Food Safety Act, Hazard Analysis and Critical Control Points (HACCP), Threat Analysis of Critical Control Points (TACCP), and Vulnerability Assessment of Critical Control Points (VACCP).
K7	Properties of food and drink, packaging materials and sealing techniques	Understands the properties of given food and drink, packaging material or sealing technique and its impact on given engineering task.
K12	Food and drink equipment	Understands types of food and drink equipment and their application: pumps, valves, gauges, temperature controls, mixers, conveyors, depositors, sealers, safety systems, pressure systems and transmitters, human machine interface, and handheld devices. The importance of set points.
K13	Spares and services considerations	Understands spares and services considerations: availability, stock lead times, correct handling, the identification of equipment and parts, function and specification of parts, spares, and

		components, stock value, faulty stock, returns, salvageability of parts to be removed.
K18, S20	Mathematical and scientific principles	Applies mathematical and scientific principles to complete given task.
K19	Engineering materials	Understands engineering materials and their properties and impact on use in a food environment (food safe)
K20	Maintenance strategies	Understands maintenance strategies and best practice: run to failure (breakdown maintenance), preventive (scheduled) maintenance, Predictive Maintenance (PdM), and Reliability Centered Maintenance (RCM).
K23, S17	Equipment performance measures	Reads and interprets equipment performance data, understanding equipment performance terminology
K24	Mechanical principles	Understands mechanical principles. Types of mechanical drives, belts, chains, and gears: alignment, and how to identify wear. Types of bearings: application, alignment, and fit
K27	Pneumatic and hydraulic system principles	Understands pneumatic and hydraulic system principles: transfer of energy inside fluid power systems in the food and drink industry

K28	Basic engineering theory and thermodynamic principles	Understands basic engineering theory and thermodynamic principles on heat transfer used in the food and drink industry: how it works and maintenance requirements
K29	Electrical principles	Understands electrical principles. Basic electrical theory: LV (Low Voltage), HV (High Voltage), current, resistance, symbols and terminology. Electrical first aid. Alternating current (AC) and direct current (DC) systems. Testing equipment. Electrical circuit theory, electrical machines, electrical safety systems, and smart solutions
K30	Control circuit principles	Understands control circuits principles. Basic components (Switches, relays, contactors, overloads, circuit breakers), power supplies, and calibration
K31	Safety circuits	Understands safety circuits: safety system categories, safety system architecture and components, characteristics of safety system components. What they do and why they are important (legality and performance).
K32	Motors and control systems	Understands types of motors and control systems and how they work: mechanical and electrical properties, programming of variable speed drives and parameters, soft starts

Grades for each component are calculated as follows:

Assessment component	Grading calculation
OQ	The observation with questions is marked holistically against the grading criteria above and using the following grade calculation: **Available grades: Fail/pass/distinction** **Grade boundaries:** **Fail**: one or more Pass grading criteria are not achieved **Pass:** all Pass grading criteria are achieved **Distinction:** all Pass and all Distinction grading criteria are achieved
IPE	The IPE is marked against the grading criteria above and using the following grade calculation: **Available grades: Fail/pass/distinction** **Fail:** one or more Pass grading criteria are not achieved **Pass:** all Pass grading criteria are achieved **Distinction:** all Pass and all Distinction grading criteria are achieved
WKT	15 x long response questions with 5 marks for each question. **Available grades: Fail/pass** **Grade boundaries:** **Fail**: 0-51 marks out of 75 **Pass**: 52-75 marks out of 75
MCT	40 x multiple choice questions: 1 mark for each correct answer **Available grades: Fail/pass** **Grade boundaries:** **Fail**: 0-27 marks out of 40 **Pass**: 28-40 marks out of 40

Overall EPA grade calculation:

Grades from individual assessment methods are combined in the following way to determine the grade of the EPA as a whole:

OQ	IPE	WKT	MCT	OVERALL GRADING
Fail	Any grade	Any grade	Any grade	**Fail**
Any grade	Fail	Any grade	Any grade	**Fail**
Any grade	Any grade	Any grade	Fail	**Fail**
Any grade	Any grade	Fail	Any grade	**Fail**
Pass	Pass	Pass	Pass	**Pass**
Pass	Distinction	Pass	Pass	**Merit**
Distinction	Pass	Pass	Pass	**Merit**
Distinction	Distinction	Pass	Pass	**Distinction**

Specimen assessments

OQ example questions:

Standard reference	OQ Sample questions
K44, S2	Give an example of how you plan your work to use resources efficiently. How can effective planning mitigate against potential issues?
S4	Give 2 examples of food safety considerations when you are planning and undertaking maintenance work.
S10, S11	How did you mitigate against potential errors when completing your tasks today?
K22, S10	Describe a task you have undertaken to maintain a fluid power system. What techniques did you use and how did you ensure they were food safe?

IPE example questions:

Standard reference	IPE sample questions
K21 S12	Give an example of a reliability technique you have used. Why did you use this particular technique?
K26 S18	Give an example of a component you have manufactured. How did you make it and how did you ensure it was within tolerance?
K39, K40, S22	Give an example of a problem-solving technique you have used. What value do these sorts of techniques give to the business?
K33	Why is it important that installation of new equipment is completed in line with food and drink regulations?
K46 S29	Describe 2 reports that you have produced for different audiences. How did you ensure the content was suitable for that particular audience?

WKT example questions:

Question 1 - K28 Grading criterion: Understands basic engineering theory and thermodynamic principles on heat transfer used in the food and drink industry: how it works and maintenance requirements

Question:

Describe the process of indirect heat transfer in a heat exchanger. Use an example in your answer. (5marks)

Indicative answer:

The indirect heat transfer process in a drum dryer relies on the heat from the drum's shell to dry or heat the material through conduction and radiation. (2 marks)To achieve conduction, hot water is poured over the drum as it rotates, heating the outer shell which conducts the heat to the material inside, and evaporates moisture. (1 mark)The hot water does not come into direct contact with the material to be dried at any point.(1 mark) To achieve radiation, electromagnetic waves from the hot outer shell of the drum to the material inside (1 mark).

Question 2 - K24 Grading criteria: Understands mechanical principles. Types of mechanical drives, belts, chains, and gears: alignment, and how to identify wear. Types of bearings: application, alignment, and fit

Question:

Bearings are often used in mechanical systems. Describe their function (1 mark). State four types of bearing and describe their typical use. (4 marks)

Indicative answer:

Bearings are used to restrict metal to metal contact, and are used in rotary or linear motion (1 mark)

Ball bearing – these are a common bearing and are used when there is no axial load (1 mark).

Tapered bearing – these are used when there is single direction axial force (1 mark).

Plain bearing – this is a simple design used for slow shaft rotation (1 mark).

Thrust bearing – these are used when there is axial load (1 mark).

MCT example questions:

Question 1

Which standard should the use of fluid power systems in explosive atmospheres comply with?

a. IOSH

b. COSSH

c. WEEE

d. ATEX

Correct answer: d

Question 2

Where a three-phase electricity supply has a voltage of 415V, the voltage of each line is

a. 11Kv

b. 3.3Kv

c. 240V

d. 110V

Correct answer: c

Additional information and guidance

Additional information relating to the EPA and the Food and Drink Maintenance Engineer apprenticeship can be found in the following documents:

- Food & Drink Maintenance Engineer End-point Standard and Assessment Plan ST0195/V1.1, available from Food and drink maintenance engineer / Institute for Apprenticeships and Technical Education
- Food & Drink Maintenance Engineer Apprenticeship Standard ST0195/V1.1 – Employer and Training Provider Guide to End-point Assessment, available from epa@fdq.org.uk
- Sample tests available from epa@fdq.org.uk for further details.

Record of revisions to this document

Version	Description of change	Date
2	Page 3 – Fitness for Purpose added	03.11.2023