Institute for Apprenticeships & Technical Education

HEALTHCARE ENGINEERING SPECIALIST TECHNICIAN

Details of standard

This standard has options. Display duties and KSBs for:

All

Occupation summary

This is a core and options apprenticeship standard. Apprentices must be trained and assessed against the core and one option. There are two options:

- Option 1: Healthcare medical devices technician
- Option 2: Healthcare estates technician

The occupations are found in the engineering industry, working in the healthcare sector.

They work in sites where healthcare engineering takes place. This includes hospitals, dental hospitals and practices, clinics, prisons, ambulance trusts, care centres, health centres, hospices, GP practices, and mental health hospitals and secure units.

They work for NHS trusts, private healthcare providers, healthcare medical devices suppliers, healthcare estates suppliers and owners, or PFI (Private Finance Initiative) contractors.

Healthcare medical devices technicians work on medical devices. Healthcare estates technician work on plant, building services and systems. Most technicians work across a wide range of healthcare devices or healthcare estates.

They work in clinical settings and often have contact with patients. They may complete work where patients are present or where the medical device is connected to the patient. They witness patients in various stages of their illness or recovery.

The broad purpose of the occupation is to ensure patient safety and service continuity for specialist healthcare medical devices or healthcare estates in a clinical setting. They conduct planned maintenance to prevent issues occurring and reactive maintenance. Other duties include acceptance testing, installation, decommissioning, and safety tests and checks. Conducting handovers is an important part of the role. This requires explaining complex technical information and regulatory advice on healthcare devices or healthcare estates to clinical staff. Completing documentation and reports, and keeping stakeholders informed of their work status is also part of their role. As part of a team, they contribute to continuous improvement. They may support and coach others.

Healthcare medical devices technicians also conduct healthcare device audits, test, and calibrate equipment. Whereas healthcare estates technicians also manufacture parts, spares and components, and

conduct site surveys.

They may work as part of a team or alone. They may spend a day at one site or work across sites. A driving license may be needed. They may use a company vehicle. They may work shifts or unsociable hours and may be required to be on-call.

In their daily work, they interact with other technicians, patients, healthcare staff and members of the public. Healthcare staff could include for example, consultants, doctors, nurses, dentists, pathology, and medical imaging staff. They may also have contact with suppliers and manufacturers. They typically report to a specialist engineering and estate managers.

They are responsible for completing their duties in line with company procedures and priorities. They must ensure a safe and secure environment for patients, staff, and visitors. And ensure patient dignity, respect and Caldicott principles (patient confidentiality) are met. They must comply with health and safety, environmental, sustainability, and engineering regulations and standards including specific healthcare requirements. They must comply with medical protocols for infection prevention and biohazard control. This may include wearing specialist healthcare Personal Protective Equipment (PPE). They work under limited direct supervision, ensuring the quality and accuracy of their own work and sometimes the work of others. They must ensure work is completed safely within agreed timescales, with minimal disruption to critical health services and within budgets. They must present a professional image of their employer and themselves.

Employers may require a Disclosure and Baring Service (DBS) certification, occupational health screening and colour blindness tests.

Typical job titles include:

Biomedical technician | **Building services technician** | **Clinical engineer**

Dental engineering technician | **Instrument curator** | **Maintenance craftsperson**

Maintenance shift specialist | **Medical electronics technical**

Medical electronics technician | **Medical engineering technician**

Medical service engineer | **Multi-skilled craftsperson**

Radiotherapy engineering technician | **Specialist craft person - electrical/mechanical**

Entry requirements

Typically, GCSE grade B / 5 or above in mathematics, plus four other GCSE subjects at grade C / 4 or above, one being a science based subject.

Core occupation duties

DUTY	KSBS
Duty 1 Organise, coordinate and action healthcare engineering specialist work to meet stakeholders' requirements and priorities including continuity of service. Identify time-frames for work and potential impact of work on clinical services for example, shutdown required. Seek authorisation to carry out work and permit to work where required. Arrange access to the ward or department. Arrange required resources.	K1 K3 K6 K7 K8 K9 K10 K11 K13 K16 K18 K19 K21 K23 S1 S2 S7 S12 S14 S15 S19 S20 B1 B2 B3 B4 B5 B6
Duty 2 Identify faults with healthcare equipment and services and action needed.	K1 K2 K3 K4 K7 K8 K9 K19 K22 K24 K25 K27 K28 K29 K34 K36 S4 S6 S7 S8 S10 S11 S12 S13 S21 S25 S29 S31 B4 B6 B7
Duty 3 Conduct safety checks and performance monitoring (energy usage) for healthcare equipment and services.	K1 K2 K3 K4 K6 K7 K8 K9 K23 K31 K36 S4 S6 S7 S8 S10 S11 S12 S13 S31 B2 B4 B6 B7
Duty 4 Contribute to continuous improvement in the healthcare engineering specialist function. For example, make suggestions to improve standard operating procedures.	K1 K2 K3 K4 K6 K7 K9 K11 K13 K16 K37 S7 S12 S14 S18 S19 S32 B1 B2 B3 B4 B5 B7
Duty 5 Handover and provide technical and regulatory advice to clinical staff, administrators and/or managers on healthcare engineering equipment and services.	K1 K11 K13 K16 K17 S7 S8 S12 S14 S17 S19 B1 B3 B4 B5 B7
Duty 6 Inform stakeholders of healthcare engineering work status. For example, patients, ward managers, clinical staff, estates or devices managers.	K1 K11 K13 K16 K18 K23 S14 S16 S17 S19 S20 B1 B3 B4 B5
Duty 7 Complete documentation for healthcare engineering specialist work. For example, risk assessments, equipment service records, and test results.	K1 K3 K7 K9 K10 K11 K13 K14 K15 K18 K21 K23 K36 S1 S6 S9 S12 S13 S14 S16 S17 S19 S20 B2 B4 B5

Duty 8 Complete written reports for healthcare engineering specialist function. For example, adverse incident reports, technical investigations, equipment appraisals and specifications.	K1 K4 K6 K7 K9 K11 K12 K13 K14 K15 K18 K23 K24 S12 S14 S16 S17 S18 S19 B1 B2 B4 B7
Duty 9 Support and mentor members of the healthcare engineering specialist team.	K1 K11 K13 K16 K17 S14 S17 B3 B4 B5 B7
Duty 10 Ensure availability and performance of maintenance tools and equipment for healthcare engineering specialist function including specialist testing instruments. For example, multimeter and electrical testers.	K1 K4 K7 K8 K9 K19 K20 S3 S5 S6 S7 S9 S25 S26 S27 S28 S29 S30 S31 B2 B4
Duty 11 Complete acceptance testing for healthcare engineering specialist equipment. For example, for equipment installed by manufacturer or approved supplier, equipment received and/or equipment being evaluated for purchase.	K1 K2 K3 K4 K6 K7 K8 K9 K11 K19 K22 K23 K24 K25 K27 K28 K29 K30 K34 K36 S4 S6 S7 S8 S9 S10 S11 S12 S13 S25 S29 S31 B2 B4 B6 B7
Duty 12 Conduct electrical and mechanical safety testing and checks for healthcare engineering specialist equipment. For example, portable appliance testing (PAT) and electronic safety tests.	K1 K2 K3 K4 K6 K7 K8 K9 K11 K19 K22 K23 K24 K25 K26 K27 K28 K29 K30 K36 S4 S6 S7 S8 S9 S10 S11 S12 S21 S25 S29 S31 B1 B2 B3 B4 B6 B7
Duty 13 Contribute to audits. For example, asset checking, compliance checks, condition auditing, internal or external quality audits.	K1 K4 K6 K7 K9 K11 K12 K13 K14 K36 S6 S7 S12 S13 S14 S16 S18 S19 S20 B2 B3 B4 B5 B7

Option duties

Healthcare medical devices technician duties

DUTY	KSBS
Duty 14 Option 1: Healthcare medical devices technician. Install healthcare medical devices.	K1 K2 K3 K4 K5 K6 K7 K8 K9 K19 K22 K24 K25 K26 K27 K28 K29 K30 K32 K36 K39 K40 K41 K42 S4 S6 S7 S8 S9 S10 S11 S12 S13 S21 S22 S23 S29 S30 S31 S33 B1 B2 B3 B4 B6 B7
Duty 15 Option 1: Healthcare medical devices technician. Decommission healthcare medical devices.	K1 K3 K4 K5 K6 K7 K8 K9 K19 K22 K24 K25 K26 K27 K28 K29 K30 K32 K36 K38 K40 K41 K42 S4 S6 S7 S8 S9 S10 S11 S12 S13 S21 S24 S25 S30 S31 B2 B3 B4 B6 B7
Duty 16 Option 1: Healthcare medical devices technician. Conduct planned and preventative maintenance for healthcare medical devices.	K1 K2 K3 K4 K5 K6 K7 K8 K9 K19 K22 K24 K25 K26 K27 K29 K30 K33 K36 K38 K39 K40 K41 K42 S4 S6 S7 S8 S9 S10 S11 S12 S13 S21 S25 S26 S28 S29 S30 S31 S33 B1 B2 B3 B4 B6 B7
Duty 17 Option 1: Healthcare medical devices technician. Conduct reactive and breakdown maintenance.	K1 K2 K3 K4 K5 K6 K7 K8 K19 K22 K24 K25 K26 K27 K28 K29 K30 K33 K34 K35 K36 K38 K39 K40 K41 K42 S4 S6 S7 S8 S9 S10 S11 S12 S13 S21 S25 S26 S27 S28 S29 S30 S31 S33 B1 B2 B3 B4 B6 B7
Duty 18 Option 1: Healthcare medical devices technician. Conduct healthcare medical devices audits, to ensure compliance with safety standards and procedures.	K1 K3 K4 K5 K6 K7 K8 K9 K19 K22 K23 K24 K25 K36 K38 K40 K41 S4 S6 S7 S8 S9 S10 S11 S12 S13 S19 S21 S29 B1 B2 B3 B4 B6 B7
Duty 19 Option 1: Healthcare medical devices technician. Test and calibrate healthcare devices used in the diagnostic and therapeutic treatment of patients.	K1 K3 K4 K7 K8 K19 K20 K22 K23 K36 K38 K40 K41 S4 S6 S7 S8 S9 S10 S11 S12 S13 S29 S33

B1 B2 B3 B4 B6 B7

Healthcare estates technician duties

DUTY	KSBS
Duty 20 Option 2: Healthcare estates technician. Install healthcare plant and estates equipment and systems.	K1 K2 K3 K4 K5 K6 K7 K8 K9 K19 K22 K23 K24 K25 K26 K27 K28 K29 K30 K32 K36 K43 K44 K45 K46 S4 S6 S7 S8 S9 S10 S11 S12 S13 S21 S22 S23 S29 S30 S31 B1 B2 B3 B4 B6 B7
Duty 21 Option 2: Healthcare estates technician. Decommission healthcare plant and estates equipment and systems: buildings or equipment.	K1 K3 K4 K5 K6 K7 K8 K9 K19 K22 K24 K25 K26 K27 K28 K29 K30 K32 K36 K43 K45 K46 S4 S6 S7 S8 S9 S10 S11 S12 S13 S21 S24 S25 S30 S31 B2 B3 B4 B6 B7
Duty 22 Option 2: Healthcare estates technician. Conduct planned and preventative maintenance for healthcare estates.	K1 K3 K4 K5 K6 K7 K8 K9 K19 K22 K23 K24 K25 K26 K27 K28 K29 K30 K33 K36 K43 K45 K46 S4 S6 S7 S8 S9 S10 S11 S12 S13 S21 S25 S26 S28 S29 S30 S31 B1 B2 B3 B4 B6 B7
Duty 23 Option 2: Healthcare estates technician. Conduct reactive and breakdown maintenance for healthcare estates.	K1 K3 K4 K5 K6 K7 K8 K9 K19 K22 K24 K25 K26 K28 K29 K30 K33 K34 K35 K36 K43 K45 K46 S4 S6 S7 S8 S9 S10 S11 S12 S13 S21 S25 S26 S27 S28 S29 S30 S31 B1 B2 B3 B4 B6 B7
Duty 24 Option 2: Healthcare estates technician. Manufacture basic parts, spares, or components for healthcare estates for temporary repairs when supplies are not available. For example, flanges, washers, shims, and brackets.	K1 K7 K8 K9 K19 K22 K24 K26 K36 K43 K45 S4 S6 S7 S8 S9 S10 S11 S12 S31 S34 B2 B4 B6 B7
Duty 25 Option 2: Healthcare estates technician. Test, survey and monitor healthcare estates infrastructure and condition monitor the estate and equipment.	K1 K3 K4 K5 K6 K7 K8 K9 K36 K43 K44 K45 K46 S4 S6 S7 S8 S9 S10 S11 S12 S13 S19 S29

B1 B2 B3 B4 B6 B7

KSBs

Knowledge

K1: Engineering function in the healthcare sector; roles, duties, interdependencies and reporting channels. Types of employers. Supply chain. Audits. Stakeholder requirements and priorities including the importance of continuity of service. Principles of clinical governance; its benefits for patients and staff.

K2: Technological development and innovation in the healthcare engineering sector. Industry 4.0. IT networking.

K3: Working in a clinical environment. The patient's journey. Patient contact protocols. Patient safety, dignity, respect, confidentiality and Caldicott requirements. Personal health and safety when working in the clinical environment.

K4: Engineering standards and regulations. British Standards (BS). International Organisation for Standardisation standards (ISO). European Norm (EN). Standard Operating Procedures (SOP). What they are and how to use them.

K5: Medical protocols for infection prevention and biohazard control for example, cleaning and disinfection of tools, pre-work disinfection requirements, decontamination prior to disposal.

K6: Healthcare engineering industry regulations and guidelines. Medicines and Healthcare products Regulatory Agency regulations. Care Quality Commission regulations. Health Technical Memorandums (HTMs). What they are and how to use them.

K7: Health and safety regulations. Health and Safety at Work Act. Control of Substances Hazardous to Health (CoSHH). Working in confined spaces. Lone working. Provision of Work Equipment Regulations (PUWER). Lifting Operations and Lifting Equipment Regulations (LOLER). Electrical safety and compliance. Noise regulation. L8 Legionella. Slips trips and falls. Display Screen Equipment. The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR). What they are and how to use them.

K8: Health and safety requirements: manual handling, Personal Protective Equipment (PPE), risk assessments and method statements, specialist healthcare PPE, clinical risk assessments, signage and barriers.

K9: Environmental regulations and requirements. Environmental Protection Act. Sustainability. Waste Electrical and Electronic Equipment Directive (WEEE). Hazardous waste regulations. Re-cyclable materials and waste disposal procedures. Energy monitoring. Data logging to optimise energy performance. The Climate Change Agreements. Carbon Reduction Commitment (CRC). What they are and how to use them.

K10: Planning techniques, time management, workflow, work scheduling, work plans and documents. Work categorisation systems.

K11: Communication techniques: verbal, written, electronic. Matching style to audience. Barriers in communication and how to overcome them. Engineering terminology.

K12: Report writing.

K13: Information technology: email, word processing, spreadsheets, work management systems.

K14: Documentation methods and requirements - electronic and paper. For example, job records, timekeeping, service reports, checklists and condemn notices.

K15: Data protection requirements: General Data Protection Regulation (GDPR). Information governance. Removal of patient identifiable data.

K16: Team working techniques. Equality, diversity, and inclusion in the workplace.

K17: Training, mentoring and coaching techniques. How to pass on knowledge and provide guidance to customers or stakeholders.

K18: Financial constraints. Service level agreements.

K19: Machinery, tools, and equipment used in healthcare engineering. Purpose, safe correct use, maintenance, carriage and storage.

K20: Calibrated equipment requirements including calibration certificates.

K21: Stock and services considerations. Availability, stock lead times. Correct handling. The identification of equipment and parts. Function of parts, spares and components. Stock value. Faulty stock process. Returns process. Salvageability of parts to be removed.

K22: Manufacturers' instructions: what they are and how to use them. Warranties: what they are and impact on engineering work.

K23: Statutory certificates including electricity certificates, theatre validations.

K24: Engineering representations, drawings, and graphical information.

K25: Engineering mathematical and scientific principles: calculations, conversions, flow rates and equipment sizing.

K26: Engineering materials and their properties; impact on use.

K27: Mechanical principles: motion and mechanics, storage and transfer of forces and energy in operation, motors and pumps.

K28: Electrical and electronic principles: principles of electricity and electronics, electric circuit theory, motors and pumps.

K29: Mechatronics principles: key components of integrated mechanical and electrical systems; their design and operation.

K30: Control systems principles.

K31: Energy consumption and usage profiling.

K32: Installation, commissioning and decommissioning practices and techniques.

K33: Maintenance practices and techniques: planned, preventative and predictive methods and frequency, and reactive.

K34: Fault finding and problem solving techniques: diagnostics, troubleshooting and testing for minor faults for example, component failure in system or circuit, lighting or socket failure, transformer issues, fire alarm system errors. Common causes of faults.

K35: Repair practices and techniques.

K36: Quality assurance principles and practice. Record keeping.

K37: Continuous improvement principles and practices for the benefit of the organisation, patient, client, or work process. For example, Lean, Six Sigma, Kaizen.

K38: Option 1. Healthcare medical devices technician: Purpose and operation of devices and impact on service continuity: •diagnostic and therapeutic equipment: anaesthetic machines, patient ventilators, and critical life support machines •operating theatre and pathology equipment •monitoring and infusion devices •portable imaging equipment and scanners including hand, CT (Computerised Tomography) and MRI (Magnetic Resonance Imaging) •renal dialysis equipment •gas delivery systems •assistive technology.

K39: Option 1. Healthcare medical devices technician: Physiology and anatomy in relation to medical equipment.

K40: Option 1. Healthcare medical devices technician: BS EN 60601 and BS EN 62353 Safety testing of medical electrical equipment and medical electrical systems.

K41: Option 1. Healthcare medical devices technician: Quality control systems: medical devices directive, lifecycle management and hazard notices.

K42: Option 1. Healthcare medical devices technician: Networking and integration of healthcare medical devices - requirements for network connections between devices or systems.

K43: Option 2. Healthcare estates technician: Purpose and operation of estates; interconnections of systems and impact on service continuity: •critical theatre ventilation systems •life-critical medical electrical distribution for healthcare estates with back-up generators - Isolated Power Supply (IPS) and Uninterruptible Power pipeline Supply (UPS) •medical gas systems and medical air and vacuum •critical resilience back-up systems •high pressure gas supplies •high vacuum systems •medical sterilisation systems including sterlizers, washer disinfectors and ultrasonic cleaners •steam systems (clean steam, sterilisation) •hot and cold water systems •lifts (safety checks and safe rescue) and patient hoists •nurse call systems •fire safety systems •foul and storm drains •heat, light and power systems, including boilers •energy management systems •catering equipment maintenance •domestic services and portering equipment •security equipment maintenance.

K44: Healthcare estates technician. Estates engineering industry regulations and guidelines. Health Building Notes. Premises Assurance Model (PAM). What they are and how to use them.

K45: Option 2. Healthcare estates technician: Estates Health and safety regulations and requirements. Asbestos awareness. Working at height. Permits to work. Safety passports. Vehicle safety. Pressure Systems Safety Regulations (PSSR). Construction Skills Certification Scheme compliance. EH40 workplace exposure limits. Building Management System (BMS). Site survey requirements and processes. What they are and how to use them. Limits of role and role of specialist contractors on medical gas systems.

K46: Option 2. Healthcare estates technician: System resilience. Site wide energy infrastructure and the associated resilience needed to ensure continuity of service. Uninterruptible Power Supply (UPS), Generators, Dual fuel systems.

Skills

S1: Plan and schedule own and others' work.

S2: Monitor, obtain and check stock and supplies, and complete returns.

S3: Check tools and equipment including calibration records of test equipment where applicable. Complete maintenance of tools and equipment including calibration where required.

S4: Select and use hand tools, specialist tools and instruments including electrical safety test equipment.

S5: Store tools and equipment.

S6: Identify and document risks and hazards in the workplace. Advise on and apply control measures.

S7: Comply with health and safety regulations, legislation, and safe working practices including signage and barriers.

S8: Comply with any clinical restrictions in work area. For example, wearing healthcare PPE.

S9: Comply with statutory and organisation environmental and sustainability requirements: safe disposal of waste, re-cycling or re-use of materials and efficient use of resources.

S10: Follow manufacturers' instructions and procedures.

S11: Follow standard operating procedures.

S12: Read and interpret information. For example, text, data, engineering drawings, job card, work instructions, risk assessments, method statements, operation manuals.

S13: Collect and record data. For example, energy usage, test results.

S14: Communicate with colleagues and stakeholders for example, patients, colleagues, managers,' and the public – verbal, written or electronic. Use sector/industry terminology where appropriate.

S15: Negotiate with stakeholders such as clinical team or authorised person. For example, to access equipment or arrange system outage.

S16: Identify and report on progress and issues or concerns where applicable.

S17: Provide information, guidance, or training to colleagues or stakeholders. For example, clinical staff.

S18: Write reports. For example, adverse incident reports, technical investigations, equipment appraisals and specifications, improvement suggestions.

S19: Use information technology. For example, for document creation, communication, and information management.

S20: Enter information to record work activity. For example, job sheets, risk assessments, equipment service records, test results, handover documents and manufacturers' documentation, asset management records, work sheets, checklists, waste environmental records and any legal reporting requirements.

S21: Lock off and isolate equipment or systems.

S22: Complete commissioning checks.

S23: Assemble, position and fix equipment or components.

S24: Disconnect and remove equipment or components. Categorise equipment and components for re-use, disposal, or re-cycling. Complete storage measures to prevent deterioration.

S25: Assess condition of components and equipment. Identify action required.

S26: Apply maintenance practices and techniques. For example, clean, lubricate, replace parts.

S27: Use troubleshooting equipment and apply fault-finding and diagnostic testing procedures to identify faults.

S28: Replace, fit and repair components.

S29: Test and check equipment or system against quality and operational parameters.

S30: Use washer disinfectors, steam sterilisers or alternatives to decontaminate healthcare equipment and maintenance tools and equipment.

S31: Restore the work area on completion of the activity. Return resources and consumables.

S32: Apply continuous improvement techniques. Devise suggestions for improvement.

S33: Option 1: Healthcare medical devices technician. Calibrate healthcare equipment.

S34: Option 2: Healthcare estates technician. Design and cut, drill, weld as appropriate to produce basic parts, spares or components where consent to manufacture is given.

Behaviours

B1: Patient focus. For example, aims to maintain continuity of service and improve service, sensitive to clinical environment and maintains patient confidentiality.

B2: Prioritise health, safety, sustainability and the environment.

B3: Act professionally representing employer well. For example, respectful, friendly, courteous, tactful, uses appropriate language, instils confidence. Take account of equality and diversity considerations. Act in a non-discriminatory manner.

B4: Take responsibility. Completes work with minimal supervision. Knows own limitations and asks for help where needed.

B5: Team player. Keeps colleagues informed. Supports colleagues to complete work and develop. Considers implications of their own actions on others in the team.

B6: Adaptable. For example, responds positively to changing priorities and deadlines. Resilient under pressure. Manages multi-skilled tasks and works to deadlines.

B7: Committed to continued professional development. Keeps up to date with developments in the engineering industry and healthcare sector.

Qualifications

English and Maths

Apprentices without level 2 English and maths will need to achieve this level prior to taking the End-Point Assessment. For those with an education, health and care plan or a legacy statement, the apprenticeship's English and maths minimum requirement is Entry Level 3. A British Sign Language (BSL) qualification is an alternative to the English qualification for those whose primary language is BSL.

Professional recognition

This standard aligns with the following professional recognition:

- The Institution of Healthcare Engineering and Estate Management (IHEEM) for Technician (TIHEEM)
- Engineering Council for Engineering Technician (EngTech)

Additional details

Occupational Level:

3

Duration (months):

48

Review

This apprenticeship standard will be reviewed after three years

Example progression routes

Electrical or electronic technical support engineer (degree)

Version log

VERSION	CHANGE DETAIL	EARLIEST START DATE	LATEST START DATE	LATEST END DATE
1.0	Approved for delivery	27/05/2021	Not set	Not set