



Skills England

Standard Draft Preview

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Standard in development
L3: Advanced plumbing and heating engineer
Version 2.0

Title of occupation

Advanced plumbing and heating engineer

UOS reference number

ST1463

Core and options

No

Level of occupation

Level 3

Occupational maps data

Route: Construction and the built environment

Pathway: Building Services Engineering

Cluster: Utilities installation and maintenance advanced technician

Typical duration of apprenticeship

18 months

Target date for approval

01/08/2027

Resubmission

No

Would your proposed apprenticeship standard replace an existing framework?

No

Does professional recognition exist for the occupation?

Yes

Regulated occupation

Is this a statutory regulated occupation?

No

Occupational summary

This occupation is found in the construction, plumbing and domestic heating and utilities sectors.

The broad purpose of the occupation is to plan, design, install, maintain, fault-diagnose, repair, and test a wide range of plumbing and heating systems in different types of buildings,

including small, medium, and large houses, commercial buildings, and larger projects.

A person in this role works on systems that include cold and hot water supplies; sanitation and wastewater systems; rainwater collection and drainage systems; and low-temperature hydronic heating systems. An advanced plumbing and heating engineer may also work on more complex systems and larger projects, involving specialist design advice.

Day-to-day tasks for an advanced plumbing and heating engineer may include planning and designing plumbing and heating systems; installing pipework, hot and cold-water systems, and radiators; and commissioning systems so that they work safely and efficiently. Tasks also include carrying out heat loss calculations, pipe sizing, mass flow rate checks, and pressure calculations, along with fault finding and repairing issues with hot and cold water, heating, sanitation, or rainwater systems. Testing performance to ensure systems meet regulations and industry standards is also required.

An advanced plumbing and heating engineer at this level would also produce system designs and often carry out more complex, maths-based work to ensure systems are efficient and meet building requirements.

In their daily work, an employee in this occupation may also be required to communicate with customers, sales assistants at suppliers, and other members of the construction workforce.

An employee in this occupation will be responsible for designing and installing both simple and complex plumbing systems. They will ensure all work meets building regulations, safety requirements, and industry standards. This person will oversee commissioning, testing, and handover of completed systems, ensuring installations run smoothly and are delivered to a high standard. They will solve problems, offer technical advice, and are likely to supervise other members of the plumbing team.

Disclaimer: The definition of the term "system" relates to the pipework, the components and controls and does not include the energy source such as domestic natural gas, solid fuel, LPG, oil, renewable technologies. An advanced plumbing and heating engineer is not responsible for connection to the energy source.

Typical job titles

Lead plumbing engineer

Plumber

Plumber and heating engineer

Plumbing and heating technician

Plumbing and sanitation engineer

Are there any statutory / regulatory or other typical entry requirements?

Yes

Entry requirement label

Apprentices entering this occupation will have completed the Level 2 Domestic Plumber Standard or hold equivalent qualifications and industry experience on entry. Employers will set their own entry requirements.

Occupation duties

DUTY	KSBS
Duty 1 Work within health, safety, and welfare requirements and guidelines to safeguard themselves, clients, visitors to site, and the general public.	K1 K2 K3 K4 K5 K6 K7 K8 K12 K13 S1 S2 S3 S4 S5 S6 S7 B1 B2
Duty 2 Plan and design complex plumbing systems, hot and cold water systems, low temperature hydronic heating systems, above ground sanitation and rainwater systems.	K7 K8 K9 K10 K11 K12 K13 K14 K15 K16 K17 K18 K19 K23 K25 K26 K27 K28 S2 S6 S7 S8 S9 S10 S11 S12 S13 S14 S15 S16 S18 S19 S21 S22 B2 B3
Duty 3 Carry out preparatory work for the installation of complex plumbing systems, hot and cold water systems, low temperature hydronic heating systems, above ground sanitation and rainwater systems.	K9 K10 K11 K12 K13 K14 K15 K25 K26 K27 K28 K30 S8 S9 S10 S12 S21 S22 S23 S24 B2 B3
Duty 4 Install complex direct, indirect and boosted cold water systems, vented, unvented and instantaneous hot water systems, complex above ground sanitation systems and rainwater systems.	K10 K11 K12 K13 K15 K20 K21 K24 K25 S9 S10 S12 S13 S15 S16 S17 S20 S21 B2 B3 B4
Duty 5 Install low temperature hydronic heating systems, pipework, heat emitters and controls.	K10 K14 K22 K23 S9 S11 S14 S18 S19 B2 B3 B4
Duty 6 Carry out commissioning and performance testing procedures on complex plumbing systems, hot and cold water systems, low temperature hydronic heating systems and above ground sanitation.	K10 K11 K12 K13 K14 K15 K29 K30 K31 K32 K33 K34 S9 S10 S11 S12 S25 S26 S27 S28 S29 B2 B3 B4
Duty 7 Diagnose and rectify mechanical, electrical and systems faults on complex plumbing systems, hot and cold water systems, low temperature	K10 K14 K15 K25 K29 K32 K37 K38 K39 K40 K41 K42

hydronic heating systems, and above ground sanitation.	S9 S10 S11 S12 S21 S25 S27 S32 S33 S34 S35 S36 B2 B3 B4
Duty 8 Permanently and temporarily decommission complex plumbing systems, hot and cold water systems, low temperature hydronic heating systems, above ground sanitation and rainwater systems.	K11 K12 K13 K14 K15 K25 K27 K28 K29 K32 S10 S11 S12 S21 S23 S24 S25 B2 B3 B4
Duty 9 Perform handover of systems to customers and end users.	K7 K31 K32 K35 K36 S6 S30 S31 B1 B3

KSBs

Knowledge

K1: Health and safety legislation, regulations, approved documents, Codes of Practice and guidance.

K2: Principles and practices of the Building Safety act relevant to the role.

K3: Safe working practices and principles, including use of personal protective equipment (PPE).

K4: Principles and methods of risk and hazard identification, mitigation and recording.

K5: Control measure application, method statements and permits to work.

K6: The role and responsibilities of other people within the plumbing industry, for example, clients, customers, management, co-workers, site visitors.

K7: Team working and communication principles and techniques.

K8: Limits of authority, when to escalate tasks and issues and to whom.

K9: Principles and techniques of planning work programmes: order, resource and time management, stages and needs.

K10: Environmental and sustainability regulations and guidance.

K11: Regulations, legislation, industry standards, codes of practice and manufacturer's instructions for non-gravity and boosted cold water systems and unvented hot water systems.

K12: Water supply (water fittings) regulations.

K13: Building regulations approved document G3: Hot water supply and systems and its implications.

K14: Regulations, legislation, industry standards, codes of practice and manufacturer's instructions for low temperature hot water heating systems. For example, building regulations, Part L, J and O.

K15: Regulations, legislation, industry standards, codes of practice and manufacturer's instructions for domestic and commercial above ground sanitation and rainwater systems, for example Building regulations part H.

K16: Principles and techniques for the design of hot and cold water systems, including water efficiency calculator, loading units, pipe sizing, flow rates, performance testing, temperatures, cold water storage, hot water storage, pump and accumulator size, hot water secondary circulation pipe sizing.

K17: Principles and techniques for the design of low temperature hot water heating systems including room by room heat loss, delta temperature (Dt), systems that run at less than 55 degrees C, mean Water Temperature (MWT), Mean Water Air Temperature (MW/AT), Heat generator size, heat emitter size, correction factors, pipe sizing, fittings and components resistance, pressure loss, flow rates, determination of index circuit and circulator size.

K18: Principles and techniques for the design of above ground sanitation including discharge units, flow rates, soil stack and waste pipe sizing.

K19: Principles and techniques for the design of rainwater systems, including roof areas, rain fall intensity, flow rates gutter and rainwater pipe sizing.

K20: The types, layout features, working principles and specialist components of non-gravity and boosted cold water and unvented hot water systems and the principles and techniques of installation.

K21: The types, layout features, working principles and components of Rainwater Harvesting and Greywater recycling systems.

K22: The types, layout features, working principles, components and installation principles and techniques for low temperature hot water heating systems.

K23: Principles and techniques for selecting, installing and setting to work system controls for low temperature hot water heating systems.

K24: The types, layout features, working principles, components and principles and techniques for the installation of domestic and commercial above ground sanitation and rainwater systems for example primary ventilated stack system, secondary ventilated stack system, ventilated branch discharge stack system, stub stack.

K25: Principles, techniques and procedures for safe isolation of electrical supplies.

K26: Principles and techniques of pre-installation activities prior to undertaking electrical work, including limitations.

K27: Principles and techniques for installation, testing and decommissioning of electrical systems and components for cold water, hot water and above ground sanitation systems.

K28: Principles and techniques for installation, testing and decommissioning of electrical systems and components for low temperature hot water heating.

K29: Principles and implementation of fluid categories, air gaps and mechanical backflow prevention devices in hot and cold-water systems and components.

K30: Principles and techniques for disinfecting cold and hot water systems.

K31: Principles and techniques for commissioning and performance testing non-gravity and boosted cold water and unvented hot water systems.

K32: Principles and techniques of inspecting, servicing and maintenance requirements of unvented hot water heating systems.

K33: Principles and techniques for filling, venting, commissioning, performance testing and balancing a low temperature hot water heating system.

K34: Principles and techniques for commissioning and performance testing large domestic and commercial above ground sanitation.

K35: Principles and techniques for operating and handing over non-gravity and boosted cold water and unvented hot water systems.

K36: Principles and techniques for operating and handing over of low temperature hot water heating systems.

K37: Methods and techniques of diagnosing and rectifying faults in non-gravity and boosted cold water and unvented hot water systems and components.

K38: Methods and techniques of diagnosing and rectifying faults in low temperature hot water heating system and components.

K39: Methods and techniques of diagnosing and rectifying faults in domestic and commercial above ground sanitation systems.

K40: Principles and techniques of identifying electrical faults and defects in cold water, hot water and above ground sanitation systems and components.

K41: Principles and techniques of identifying electrical faults and defects in low temperature hot water heating.

K42: Principles and techniques of identifying below ground drainage systems including the prevention of misconnection.

Skills

S1: Comply with health and legislation, regulations, approved documents, Codes of Practice and guidance.

S2: Comply with the Building safety act within their responsibilities.

S3: Apply safe working practices and principles including selecting and using personal protective equipment (PPE).

S4: Apply principles and methods that identify, mitigate and report hazards and risks in the workplace for themselves and others.

S5: Produce method statements and apply control measures where applicable.

S6: Apply team working and communication principles and techniques.

S7: Apply knowledge of the limits of their role and responsibility and when and how to escalate tasks and issues to others.

S8: Apply principles and techniques to plan and produce work programmes.

S9: Comply with environmental and sustainability regulations and standards.

S10: Comply with cold and hot water regulations, legislation, industry standards, codes of practice and manufacturer's instructions.

S11: Comply with low temperature hot water heating regulations, legislation, industry standards, codes of practice and manufacturer's instructions.

S12: Comply with above ground sanitation and rainwater regulations, legislation, industry standards, codes of practice and manufacturer's instructions.

S13: Apply principles and techniques for calculations to a hot water and cold-water system design.

S14: Apply principles and techniques for calculations to a low temperature hot water heating system design.

S15: Apply principles and techniques for calculations to a above ground sanitation system design.

S16: Apply principles and techniques for calculations to a rainwater system design.

S17: Apply principles and techniques for installing non-gravity or boosted cold water system, and unvented hot water system.

S18: Apply installation principles and techniques for low temperature hot water heating system.

S19: Apply principles and techniques for selecting, installing and setting to work low temperature hot water heating system controls.

S20: Apply principles and techniques for installing domestic or commercial above ground sanitation system and rainwater system

S21: Apply principles and techniques of safe-isolation procedures to electrical supplies.

S22: Apply principles and techniques for pre-installation activities for electrical work, including selecting the electrical equipment, cables and components.

S23: Apply principles and techniques for installation, testing and decommissioning of electrical systems and components for cold water, hot water or on a above ground sanitation system.

S24: Apply principles and techniques for installation, testing and decommissioning of electrical systems and components for a low temperature hot water heating system.

S25: Apply principles for implementing fluid categories, air gaps and mechanical backflow prevention devices in hot and cold-water systems and components.

S26: Apply principles and techniques for commissioning and performance testing non-gravity or boosted cold water system and an unvented hot water system.

S27: Apply principles and techniques for inspecting and servicing unvented hot water storage system.

S28: Apply principles and techniques for filling, venting, commissioning, performance testing and balancing low temperature hot water heating system.

S29: Apply principles and techniques for commissioning and performance testing large domestic and commercial above ground sanitation system.

S30: Apply principles and techniques for operating and handing over to the end user non-gravity or boosted cold water and unvented hot water systems.

S31: Apply principles and techniques for operating and handing over to the end user, low temperature hot water heating systems.

S32: Apply methods and techniques for diagnosing and rectifying faults in non-gravity or boosted cold water system and an unvented hot water system and components.

S33: Apply methods and techniques to diagnose and rectify faults in low temperature hot water heating system and components.

S34: Apply methods and techniques to diagnose and rectify faults in domestic or a commercial above ground sanitation system.

S35: Apply principles and techniques of identifying electrical faults and defects in cold or a hot water system or a domestic or a commercial above ground sanitation system.

S36: Apply principles and techniques of identifying electrical faults and defects in low temperature hot water heating system.

Behaviours

B1: Act professionally, when collaborating with clients, end users, co-workers, other trades, visitors to site and members of the public.

B2: Consider the environment when using resources and carrying out processes.

B3: Team-focus to meet work goals.

B4: Respond and adapt to work demands and situations.

Qualifications

English and maths

English and maths qualifications must be completed in line with the apprenticeship funding rules.

Does the apprenticeship need to include any mandated qualifications in addition to the above-mentioned English and maths qualifications?

Yes

Other mandatory qualifications

Level 3 Diploma in Advanced Plumbing and Heating Engineering

Level: 3

Additional information: BPEC Level 3 Diploma in Advanced Plumbing and Heating Engineering, QN: TBC. City and Guilds Level 3 Diploma in Advanced Plumbing and Heating Engineering, QN: TBC. EAL Level 3 Diploma in Advanced Plumbing and Heating Engineering, QN: TBC. LCL Awards Level 3 Diploma in Advanced Plumbing and Heating Engineering, QN: TBC. NOCN Level 3 Diploma in Advanced Plumbing and Heating Engineering, QN: TBC.

Professional recognition

This standard aligns with the following professional recognition:

- Chartered Institute of Plumbing and Heating Engineering for Associate membership

Consultation

Progression routes

Supporting uploads

Mandatory qualification uploads

Mandated degree evidence uploads

Professional body confirmation uploads

Subject sector area

5.2 Building and construction