Unit 306PH: Understand core plumbing and heating systems

# Delivery guide

Unit information

The purpose of this unit is for learners to explore plumbing and heating systems within a domestic property and industrial and commercial building and the knowledge that underpins work on the different systems. Learners will understand how to:

* inspect and pre-commission plumbing and heating systems
* decommission plumbing and heating systems.

Learners may be introduced to this unit by asking themselves questions such as:

* What types of job information would you need to work on a plumbing and heating system and what documentation must you complete?
* What is inspecting and pre-commissioning a plumbing and heating system?
* What is meant by decommissioning and why does it need to be done correctly?

Learning outcomes

1. Understand relevant industry standards and regulations
2. Understand how to verify that job information and documentation is current and relevant
3. Understand how to produce a risk assessment and method statement for the work to be carried out, including the identification and use of personal protective equipment
4. Understand the procedures for confirming, before work starts, that the work location and work area can be accessed safely and has been checked for risk to other personnel on the site, and for taking appropriate action if a risk is present
5. Understand the methods for the safe transport and/or disposal of waste materials, substances and liquids
6. Understand the methods for determining that the appliances, components and accessories are fit for purpose
7. Understand the methods and techniques for inspecting and pre-commissioning the plumbing and heating system
8. Understand how to complete relevant documentation
9. Understand the methods and techniques for decommissioning the system
10. Understand the methods and techniques to ensure the plumbing and heating system cannot be accidentally reactivated or become dangerous
11. Understand how to complete relevant documentation

Suggested resources

Textbooks

* Maskrey, M. (2019) *The City & Guilds Textbook: Plumbing Book 1 for the Level 3 Apprenticeship (9189), Level 2 Technical Certificate (8202) & Level 2 Diploma (6035) (City & Guilds Textbooks))*. London:Hodder Education.

ISBN 978-1-5104-1648-2

* Tanner, P. and Lane, S. (2019) *The City & Guilds Textbook: Plumbing Book 2 for the Level 3 Apprenticeship (9189), Level 3 Advanced Technical Certificate (8202) & Level 3 Diploma (6035) (City & Guilds Textbooks)*. London:Hodder Education.

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Websites

* [Benchmark | Homepage](https://www.benchmark.org.uk/)
* [Competent Persons Register | Competent Person Schemes](https://www.competentperson.co.uk/existing-competent-person-schemes.aspx)
* [HSE | Construction health and safety](https://www.hse.gov.uk/construction/safetytopics/admin.htm)
* [HSE | Homepage](https://www.hse.gov.uk/)
* [HSE | Managing Risk](https://www.hse.gov.uk/simple-health-safety/risk/index.htm)
* [HSE | Risk Assessments](https://www.hse.gov.uk/involvement/riskassessments.htm)
* [HSE | Risk at Work - Personal Protective Equipment](https://www.hse.gov.uk/toolbox/ppe.htm)
* [Planning Portal | Homepage](https://www.planningportal.co.uk/)
* [Safety Sign UK | Safety Signs](https://www.safetysignuk.co.uk/)
* [WRAS | Homepage](https://www.wrasapprovals.co.uk/)

Legislation

* [GOV.UK | Hazardous Waste (England and Wales) Regulations 2005](https://www.legislation.gov.uk/uksi/2005/894/schedules/2005-07-16)

| **Learning outcomes** | **Criteria** | **Delivery guidance** |
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| 1. Understand the appropriate industry standards and regulations relevant to  * decommissioning * installing and testing of plumbing and heating systems | * 1. The sources of information required when undertaking work on plumbing and heating systems | * Learners to be able to identify different sources of information available to them while working on cold water systems, including those required to complete testing and commissioning. * Learners to know how examples of industry standards and regulations are applicable to the installation, decommissioning and testing of plumbing and heating systems including: * statutory legislation * building regulations * manufacturer instructions. |
| 1. Understand how to verify that job information and documentation is current and relevant and that the plant, instruments, access equipment and tools are fit for purpose | * 1. Workplace information | * Learners to be able to explain the types of workplace information and their purpose within the workplace including: * job specifications * plans/drawings * work programmes * variation orders * delivery notes * time sheets * policy documentation (health and safety, environmental, customer service) * manufacturer guidance * installation instructions * service and maintenance instructions * user instructions * customer information such as quotations and estimates, statutory cancellation rights and handover information. * Learners to know what job information is required and how to check its currency. * Learners to know how to check the equipment they will be using is fit for purpose. |
| 1. Understand how to produce a risk assessment and method statement for the work to be carried out, including the identification and use of personal protective equipment, in accordance with:  * the plumbing and heating system’s design * the conditions of the working environment | * 1. The levels of risk presented by work situations | * Learners to understand the differences between hazards and risks and to be able to identify potential risks from work activities. * Learners to be able to discuss the terms likelihood (probability that event will occur) and severity (degree of harm which may be caused). |
| * 1. The hazards presented by work situations | * Learners to understand the types of hazards presented by work situations including: * working at height * moving objects * slips, trips and falls * noise * Hand Arm Vibration Syndrome (HAVS) * material and manual handling * asbestos * airborne fibres and materials. * Learners to know the electrical dangers including: * faulty electrical equipment * signs of damaged or worn electrical cables * trailing cables * proximity of cables to services pipework * buried/hidden cables * inadequate over-current protection devices. * Learners to know the types of hazards presented by working in confined space/excavation work including: * inadequate ventilation * inadequate lighting * flooding * obstruction of an escape route * explosion * collapse. * Learners to know the types of hazards presented by working with heat producing equipment including: * explosions * fire. * Learners to know the types of hazards presented by working with chemicals including: * acute toxicity * skin corrosion/irritation * eye damage/irritation * respiratory/skin sensitisation. |
| * 1. The methods used to carry out a risk assessment for a task | * Learners to be able to demonstrate how to carry out a risk assessment for work activities including: * identifying hazards * assessing the risks using the risk calculation formula * controlling the risks * recording their findings * reviewing the controls. * Learners to be able to explain how to calculate risk rating: RISK RATING (RR): Severity x Likelihood. * Learners to be shown completed examples of risk assessments and to be able to complete one for a given work task. |
| * 1. How to produce a method statement for areas of work with safety risk | * Learners to know the purpose of a method statement and to be able to describe the contents. * Learners to be able to complete a step-by-step guide on how to complete a work task in a safe manner. * Learners to be able to provide examples of tasks where method statements are used. * Learners to be able to complete a method statement for an area of work. * Learners to be able to explain the requirements for permits to work. |
| 1. Understand the procedures for confirming, before work starts, that the work location and work area can be accessed safely and has been checked for the risk to other personnel on the site, and for taking appropriate action if a risk is present | * 1. The types of general site hazards that may be encountered while at work | * Learners to be aware of what procedures need to be followed prior to undertaking work and any actions that should be followed to ensure there is no risk to themselves or others. * Learners to be able to give examples of common workplace hazards including: * biological hazards (sewage, dust, vermin) * chemical hazards (hazardous substances) * physical hazards (heights, noise, radiation) * safety hazards (unsafe working conditions: exposed wires, tripping hazards) * ergonomic hazards (poor posture, manual handling) * psychosocial hazards (victimisation, stress). * Learners to be able to: * explain how to inspect the work location for common hazards * explain general hazards associated with using equipment, inadequate or lack of personal protective equipment, defective (unsafe) equipment * explain risks associated with personal conduct, including manual handling and working at heights. |
| * 1. The potential dangers to the workforce and members of the public when work is carried out | * Learners to understand the dangers that may occur when carrying out plumbing and heating work and how this may affect members of the public and work colleagues. * Learners to be able to provide examples to protect members of the public from the dangers of construction work such as erecting fencing, correct storage of materials, safety signs and toe boards/netting on scaffolding. * Learners to know a range of properties including industrial, commercial premises (occupied and unoccupied refurbishment), in dwellings (occupied and unoccupied refurbishment). |
| * 1. The methods that can be used to prevent accidents or dangerous situations occurring during work activities | * Learners to know the methods that can be used to prevent accidents or dangerous situations in the workplace such as: * implementing control measures like Personal Protective Equipment (PPE) * fencing * providing adequate training * displaying safety signs * performing inspections * supervising operatives. * Learners to understand and to know how to use: * risk assessments * method statements * permit to work systems. * Learners to be able to understand and explain the use of safety notices including: * mandatory signs * prohibition signs * hazard signs * firefighting signs * safe condition signs * combination signs. |
| 1. Understand the methods for the safe transport and/or disposal of waste materials, substances and liquids in accordance with suppliers’ and manufacturers’ instructions | | * Learners to know what is required when it comes to safe storage, transportation and disposal of waste materials, substances and liquids in accordance with suppliers’ and manufacturers’ instructions. * Learners to be able to explain the requirements for transporting substances and materials in accordance with supplier instructions. * Learners to be able to explain the requirements for transporting waste and the requirements of a waste carriers’ licence. * Learners to be able to explain what hazardous waste is (waste that has substantial or potential threats to public health or the environment). * Learners to know the Hazardous Waste (England and Wales) Regulations 2005. * Learners to be able to provide examples of methods of hazardous waste disposal. * Learners to know the requirements of a waste management plan and how these are put in to practice in the workplace, for example segregation of waste. |
| 1. Understand the methods for determining that the appliances, components and accessories are fit for purpose | | * Learners to develop their basic knowledge of the types of appliances, components and accessories and to be able to look at basic installations and determine what would be suitable for those applications and what procedures they should follow whilst determining the suitability. * Learners to know the methods for determining that appliances, components and accessories are fit for purpose by referring to the following documentation: * manufacturer instructions * job specifications * component specifications. * Learners to be able to explain how systems and components are checked to ensure they are fit for purpose in relation to system conditions including: * temperature * flow rate * pressure. |
| 1. Understand the methods and techniques for inspecting and pre-commissioning the plumbing and heating system in accordance with:  * the plumbing and heating system’s design * the working environment * manufacturers’ instructions * the appropriate testing procedures for confirming the systems’ integrity | | * Learners to know what is required when inspecting systems prior to commencing work and how to pre-commission the system to allow for the preceding works to be carried out in a safe manner. * Learners to be able to describe a visual inspection of system pipework and pipework systems to confirm that it is ready to be soundness tested. * Learners to be able to explain how to conduct a soundness test to industry requirements on a range of plumbing and heating systems and components. * Learners to be able to provide examples of the operational checks required during commissioning including: * temperature * flow rate * pressure * controls. * Learners to know the actions that must be taken when commissioning reveals defects. * Learners to know the procedure for handing over a system to the end-user. |
| 1. Understand how to complete relevant documentation | | * Learners to know the documentation relevant to the working environment, what needs to be completed and when. * Learners to be able to provide examples of commissioning certificates for a range of systems and to explain how to complete one. * Learners to know the information contained on each certificate including: * address * date work carried out * system type * appliances connected to the system * name of operative * soundness test pressures * flow rates * temperatures * pressures * information relating to the process. * Learners to be familiar with a range of plumbing systems. |
| 1. Understand the methods and techniques for decommissioning the system in accordance with:  * the plumbing and heating system’s design * the working environment * manufacturers’ instructions | * 1. The working methods that reduce the time periods during which plumbing, and heating systems need to be isolated | * Learners to know the ways in which disruption to the hot and cold water supply can be kept to a minimum during work activities. * Learners to be able to provide examples of working methods that reduce the time periods during which plumbing and heating systems need to be isolated such as: * installation of service valves for new sections of pipework prior to the installation task commencing * making connections to the existing pipework at the final stage of the installation * prefabrication of pipework prior to connection to the life system * the use of pipe freezing equipment * completing the work when buildings are not occupied. |
| * 1. The information that needs to be provided to other persons before decommissioning work takes place | * Learners to know how people are affected, the importance of communication throughout the task and the different levels of information that those affected need. * Learners to be able to describe appropriate and safe isolation methods for temporarily decommissioning a plumbing system and components. * Learners to be able to give examples of information that needs to be provided prior to decommissioning including: * Which systems are affected? * How long will the system be decommissioned? * Are there any alternative sources? * Learners to be able to explain the requirements to inform other trades prior to decommissioning as decommissioning may affect their progress, for example isolating the water supply will affect a plasterer being able to obtain water to mix plaster. * Learners to give examples for each system type. * Learners to develop a work programme for the permanent decommissioning of a plumbing system and underline any hazards or risks to health. |
| * 1. The procedures for decommissioning systems | * Learners to know the means of capping off pipework, including temporary methods and the most appropriate positions of notices or signs warning of a decommissioned system and the information that should be provided. * Learners to be able to explain procedures for decommissioning systems including: * notifying the relevant person * isolating the fuel/electricity supply to the system as appropriate * isolating the water supply * applying warning notices and signs * draining the system to a suitable location * appropriately disposing of contents * temporarily capping pipework sections as required * notifying building users * alternative sources of facilities or supplies as required. * Learners to be able to give examples for a range of plumbing and heating systems. |
| 1. Understand the methods and techniques to ensure the plumbing and heating system cannot be accidentally reactivated or become dangerous | * 1. The methods used during the decommissioning process to prevent the end-user from operating plumbing and heating system components | * Learners to know what documentation should be completed during the decommissioning process, what information they need to supply and where the documentation goes once it is completed. * Learners to know the methods used during decommissioning to prevent the end-user from operating plumbing and heating components, including: * notifying the relevant person * applying warning notices and signs * temporary capping of pipework sections as required * notifying building users. * Learners to be able to give examples for each plumbing and heating system type of where to apply warning notices, for example, when isolating the cold water to a property, a warning sign should be fixed to the main stop tap. * Learners to be able to provide examples of warning notices and signs during delivery. * Learners to be able to give examples for a variety of settings such as domestic properties and commercial and industrial settings. * Learners to be able to discuss types of relevant persons for example, in a school you would inform the building supervisor, in a domestic property you would inform the homeowner and in a rented property you would inform the tenant. * Learners to be able to provide examples of temporary and permanent decommissioning of plumbing systems. |
| 1. Understand how to complete relevant documentation | | * Learners to be able to provide examples of decommissioning certificates for a range of systems, to be able to explain how to complete one and to know the information contained on each certificate including: * date work undertaken * name of operative * health and safety requirements * isolation points * drain off points * temporary services available * relevant person * method of ensuring the system cannot be reactivated * pre-existing damage report * work activity description. * Learners to be able to give examples for the range of plumbing systems. |