Unit 206PH: Know 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 have the opportunity 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 I 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 the appropriate industry standards and regulations relevant to decommissioning, installing and testing of plumbing and heating systems
2. 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
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, in accordance with the plumbing and heating system's design; the conditions of the working environment
4. Understand the organisational 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
5. Understand the methods for the safe transport and/or disposal of waste materials, substances and liquids in accordance with suppliers' and manufacturers' instructions
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 in accordance with the plumbing and heating system's design; the working environment; manufacturers' instructions; the appropriate testing procedures for confirming the systems' integrity
8. Understand how to complete relevant documentation in accordance with organisational procedures
9. Understand the methods and techniques for decommissioning the system in accordance with the plumbing and heating system's design; the working environment; manufacturers' instructions
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

British Standards

* BS 7593:2019 *Code of Practice for the preparation, commissioning and maintenance of domestic central heating and cooling water systems.*

Websites

* [GOV.UK | Building regulations approval](https://www.gov.uk/building-regulations-approval)
* [HSE | Risk assessment template](https://www.hse.gov.uk/simple-health-safety/risk/risk-assessment-template-2019.docx)
* [HHIC | Benchmark Commissioning & Warranty Validation Service Record](https://www.hhic.org.uk/uploads/5D9B41557255E.pdf)
* [SafeContractor | Permit to work systems guidance](https://www.safecontractor.com/getattachment/4412cb57-52b7-47e4-b284-c40255e42513/Contractor-Accreditation-Guidance-Notes-permit-to-work-guidance-note-sa-gn-12-(v2)-jul-201)
* [SafeContractor | Plumbing method statement](https://www.safecontractor.com/getattachment/f5dc8850-22dd-4869-bf7a-6cff860388fa/Contractor-Accreditation-Guidance-Notes-plumbing-method-statement-guidance-note-sa-gn-23-(tion-Guidance-Notes-plumbing-method-statement-guidance-note-sa-gn-23-(%20(safecontractor.com))
* [Vaillant | ecoFIT pure | Installation and maintenance instructions](https://www.vaillant.co.uk/downloads/product-manuals/ecofit-pure-1/combi-5/ecofit-pure-combi-installation-and-maintenance-instructions-1943272.pdf)

Suppliers’ Websites

* [Wavin | Product overview | Plumbing and waste water drainage solutions](https://orbia.blob.core.windows.net/assets/F-29838-0.pdf)
* [Worcester Bosch | Gas-fired boiler range | Product guide 2021](https://www.worcester-bosch.co.uk/support/literature/download/8716116713)
* [Myson | Product Brochures](https://www.myson.co.uk/downloads/brochures.htm)
* [HSE | Home](https://www.hse.gov.uk/)
* [Safety Sign UK | Home](https://www.safetysignuk.co.uk/)

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).* London: Hodder Education.

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* 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).* London: Hodder Education. ISBN 978-1-51041-646-8

| **Learning outcomes** | **Criteria** | **Delivery guidance** |
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| 1. Understand the appropriate industry standards and regulations relevant to decommissioning and installing and testing of plumbing and heating systems | * 1. The sources of information required when undertaking work on plumbing and heating systems | * Learners to know how industry standards and regulations are applicable to the installation, decommissioning and testing of plumbing and heating systems, including: * statutory legislation * building regulations * industry standards * manufacturers’ instructions. * Learners to be shown examples of documents and catalogues related to plumbing and installation systems. Learners to be able to identify key pieces of information and give examples of why the information is useful. |
| 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 different 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, invoices/statements * statutory cancellation rights * handover information. * Learners to be shown examples of different types of documents and to state what they would be used for and why it is important they are fully completed. |
| 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 terms ‘likelihood’ (probability that event will occur) and ‘severity’ (degree of harm which may be caused). * Learners to be able to calculate risk rating: Risk Rating (RR): Severity × Likelihood. * Learners to be able to calculate the risk for a given task. * Learners to carry out exercises using potential incidents to calculate a risk rating based on likelihood and severity of injury. |
| * 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 * material and manual handling * asbestos * airborne fibres and materials. * Learners to understand the types of hazards presented by 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 understand the types of hazards presented by confined space / excavation work dangers, including: * inadequate ventilation * inadequate lighting * flooding * obstruction of an escape route * explosion * collapse. * Learners to understand the types of hazards presented by working with heat-producing equipment, including: * explosions * fire. * Learners to understand the types of hazards presented by working with chemicals, including: * acute toxicity * skin corrosion/irritation * eye damage/irritation * respiratory/skin sensitisation. * Learners to be aware of other hazards they might encounter when completing the commissioning or decommissioning of a plumbing system. |
| * 1. The methods used to carry out a risk assessment for a task | * Learners to know how to carry out a risk assessment for work activities, including how to: * identify hazards * assess the risks, including using the risk calculation formula * control the risks * record their findings * review the controls. * Learners to be able to present a risk assessment using standard documentation. * Learners to be shown examples of completed risk assessments. * Learners to carry out a risk assessment exercise for one aspect of the installation: commissioning or decommissioning of a plumbing or heating system. |
| * 1. How to produce a method statement for areas of work with safety risk | * Learners to be able to describe the contents and the purpose of a method statement. * Learners to be able to produce a step-by-step guide on how to complete a work task in a safe manner. * Learners to know where method statements are used and to be able to complete one. * Learners to complete an exercise to produce a method statement for a plumbing task they are familiar with. |
| 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 know and understand the common workplace hazards, including: * site/work area cleanliness: tripping hazards, slipping hazards * using equipment: inadequate or lack of personal protective equipment (PPE), defective (unsafe) equipment * personal conduct: manual handling, working at heights. * Learners to know how to inspect the work location for common hazards. * Learners to carry out a walk-around inspection of a work area and to work together to look for and record any common hazards. |
| * 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 know how to protect members of the public from the dangers of construction work, for example erecting fencing, correct storage of materials, safety signs and toe boards/netting on scaffolding. * Learners to understand approaches that can be used for different locations: * on construction sites (all property types) * in industrial commercial premises (occupied and unoccupied refurbishment) * in dwellings (occupied and unoccupied refurbishment). * Learners to recap key points and discuss the differences between dangers they could encounter when working in different locations. |
|  | * 1. The methods that can be used to prevent accidents or dangerous situations occurring during work activities | * Learners to understand the methods that can be used to prevent accidents or dangerous situations in the workplace, including: * implementing control measures such as PPE and fencing * providing adequate training * performing inspections * supervising operatives * use and understanding of method statements, permit to work systems, risk assessments * use and understanding of mandatory signs, prohibition signs, hazard signs, firefighting signs, safe condition signs, combination signs. * Learners to be shown actual examples of different types of PPE and to know when they should be used. * Learners to complete an exercise to identify the meaning of a range of health and safety 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: * the requirements for transporting substances and materials in accordance with supplier and manufacturer instructions * the requirements for transporting waste and the requirements of a waste carriers’ licence * what hazardous waste is (waste that has substantial or potential threats to public health or the environment) * the Hazardous Waste (England and Wales) Regulations * the different methods of hazardous waste disposal. * Learners to understand the requirements of a Waste Management Plan and how these are put in to practice in the workplace, for example segregation of waste. * Learners to know why it is important that materials and waste are transported safely and to know what could happen if it is not. |
| **Inspect and pre-commission** | | |
| 1. Understand the methods for determining that the appliances, components and accessories are fit for purpose |  | * Learners to understand the methods for determining that appliances, components and accessories are fit for purpose by referring to the following documentation: * manufacturers’ instructions * job specifications * component specifications. * Learners to understand how systems and components are checked to ensure they are fit for purpose in relation to system conditions, including: * temperature * flow rate * pressure. * Learners to complete exercises to select suitable appliances, components and accessories to meet given needs. |
| 1. 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: * the methods and techniques for visually inspecting system pipework and pipework systems to confirm that they are ready to be soundness tested * how to conduct a soundness test to industry requirements on a range of plumbing and heating systems and components * the operational checks required during commissioning, including temperature, flow rate, pressure and controls * the actions that must be taken when commissioning reveals defects * the procedure for handing over a system to the end user. * Learners to be shown how to complete visual inspections and soundness tests. Learners to work in pairs to complete these activities themselves, completing the relevant paperwork. |
| 1. Understand how to complete relevant documentation |  | * Learners to know how to complete commissioning certificates for a range of systems and the information contained on each certificate, including: * address * date work was 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 able to show examples for a range of plumbing systems. * Learners to inspect partially completed certificates and identify missing information. Learners to know why the missing information is needed. |
| **Decommission** | | |
| 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 understand which working methods reduce the time periods during which plumbing and heating systems need to be isolated, including: * installing service valves for new sections of pipework prior to the installation task commencing * prefabricating pipework prior to connection to the live system * using pipe-freezing equipment. * Learners to know the reasons for completing the work when buildings are not occupied. * Learners to recap the key points and to state methods that can be used to reduce time for given plumbing activities. |
| * 1. The information that needs to be provided to other persons before decommissioning work takes place | * Learners to know the information that needs to be provided prior to decommissioning, including: * which systems are affected * how long the system will be decommissioned * whether there are any alternative sources. * Learners to understand 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 know the information that needs to be provided to other persons prior to decommissioning for each system type. * Learners to be able to state what information they would need when completing decommissioning of plumbing and heating systems. |
|  | * 1. The procedures for decommissioning systems | * Learners to be able to explain procedures for both permanent and temporary decommissioning of a range of plumbing and heating 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 shown actual examples of decommissioning of plumbing and heating systems. * Learners to know the difference between permanent and temporary decommissioning. |
| 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 understand 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 * temporarily capping pipework sections as required * notifying building users. * Learners to know where to apply warning notices for each plumbing and heating system type, for example, when isolating the cold water to a property, a warning sign should be fixed to the main stop tap. * Learners to be familiar with warning notices and signs used during delivery. * Learners to be able to explain the procedures for temporary and permanent decommissioning of plumbing systems with examples. * Learners to recap the key points for decommissioning a plumbing or heating system. |
| 1. Understand how to complete relevant documentation |  | * Learners to be familiar with decommissioning certificates for a range of systems. * Learners to know how to complete a decommissioning certificate and the information contained on each certificate, including: * date the work is 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 re-activated * pre-existing damage report * work activity description. * Learners to be familiar with a range of plumbing systems. * Learners to inspect partially completed certificates and identify missing information. Learners to know why the missing information is needed. |