Unit 212PH: Performing plumbing and heating system installations

# 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 competences that underpin work on the different systems. Learners will have the opportunity to:

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

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

* What is the sequence of activities required to carry out typical tasks in my chosen trade?
* How do I joint and bend different pipework materials?
* How do I test the completed work?

Learning outcomes

1. Decommission appliances, components and accessories
2. Ensure that the plumbing and heating system cannot be accidently reactivated or become dangerous
3. Determine at the outset, that the plans for positioning and fixing the appliances, components and accessories are in accordance with the plumbing and heating system's design; the working environment; manufacturer instructions
4. Measure and mark out the locations for fitting and fixing the selected appliances, components and accessories
5. Fit, fix and connect the selected appliances, components and accessories
6. Confirm appliances, components and accessories installed are of the right type and size; fit for purpose in accordance with the plumbing and heating system’s design; suitable for the working environment in which they are installed
7. Determine that the appliances, components and accessories have been fitted in accordance with the plumbing and heating system’s design; the working environment; manufacturer instructions
8. Inspect and pre-commission appliances, components and accessories in accordance with the plumbing and heating system’s design; manufacturer instructions
9. Confirm the integrity of the installed system using appropriate testing procedures

Suggested resources

Websites

* [Planning Portal | Home](https://www.planningportal.co.uk/)
* [Pegler Yorkshire | Home](https://www.pegleryorkshire.co.uk/)
* [Rothenberger | Home](https://www.rothenberger.com/)
* [Monument Tools | Home](https://monument-tools.com/)
* [BAHCO | Home](https://www.bahco.com/gb_en/)
* [GF Fittings | Home](https://www.gfps.com/com/en/products-solutions/brands/traisen.html)

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.

ISBN 978-1-51041-648-2

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

| **Learning outcomes** | **Criteria** | **Delivery guidance** |
| --- | --- | --- |
| 1. Decommission appliances, components and accessories |  | * Learners to know the correct method and to practice how to decommission the following appliances and components.   Appliances:   * baths * WCs * wash hand basins * sinks   Components:   * mixer taps * pillar and bib taps * stop valves * servicing valves * full-way gate valves * spherical plug valves * drain valves * float-operated valves (part 1–4) * radiators * radiator valves * gutter components * soil and waste components * hot water cylinders * showers * hot water heaters. * Learners to be aware of the safe and correct disposal of waste products when decommissioning plumbing and heating systems and to use the appropriate method of disposal for the type of waste product. * Learners to be shown actual examples of how to decommission various appliances and components and then to complete the processes themselves (individually or in pairs). |
| 1. Ensure that the plumbing and heating system cannot be accidently reactivated or become dangerous |  | * Learners to practice on each system how to record, label and report decommissioned systems to prevent the use of decommissioned appliances, including: * informing the responsible person * warning notices * labels * temporary stop ends. * Learners to know how to safely isolate a range of systems following the recognised electrical safe isolation procedure (identify, isolate, prove, test, re-prove, lock/label). * Learners to be shown how to isolate various system components and then to state the key stages of the process and what needs to be done for each. |
| Install | | |
| 1. Determine at the outset, that the plans for positioning and fixing the appliances, components and accessories are in accordance with:  * the plumbing and heating system's design * the working environment * manufacturer instructions | * 1. Systems | * Learners to know the installation requirements and to practice installation on the following systems: * cold water * hot water * central heating * sanitation. * Learners to know the requirements for installing appliances in compliance with manufacturers’ instructions and the plumbing and heating system’s design. * Learners to know why it is important to follow manufacturers’ instructions. |
| * 1. The pipework | * Learners to know the requirements and methods of installing the following pipework materials and to practice their pipework fabrication skills. * Pipework materials include: * copper: R220 soft coils, R250 half hard lengths * plastic pipework: Medium-Density Polyethylene (MDPE), polybutylene, PVC-u, polypropylene, Modified Unplasticized Polyvinyl Chloride (MUPVC), Acynlonitrile-Butadiene-Styrene (ABS). * Methods of bending pipework include: * 90° bends * sets and offset bends * passover bends. * Learners to be shown actual examples of different types of pipework and to identify what the material is and what it would be used for. |
| 1. Measure and mark out the locations for fitting and fixing the selected appliances, components and accessories in accordance with:  * the plumbing and heating system's design * manufacturer instructions |  | * Learners to know how to measure and mark out the work location in relation to installation plans, manufacturers’ instructions and approved documents using the correct equipment, including: * tape measure * spirit level * pencil * laser level. * Learners to practice marking out work locations from installation diagrams. * Learners to know the correct method for installing pipe clips to industry standards for the range of pipework materials and to practice marking out and installing pipework clips for a range of materials, including. * copper: R220 soft coils, R250 half hard lengths. * plastic pipework: MDPE, polybutylene, PVC-u, polypropylene, MUPVC, ABS. * Learners to complete exercises practicing how to mark out and install different types of pipe. |
| 1. Fit, fix and connect the selected appliances, components and accessories in accordance with:  * the plumbing and heating system's design * the working environment * manufacturer instructions | * 1. Jointing methods | * Learners to know the following methods of jointing pipework: * copper pipe: solder ring and end feed, compression (type A and B), push-fit, press-fit * plastic pressure pipe: push fit, compression * proprietary: copper and MDPE * plastic soil and waste jointing: ring seal, compression, solvent. * Learners to know the types of fitting, including: * couplers/sockets * elbows and bends * equal tees * reducing tees * reducers * tap connectors * flexible connectors * manifolds * tank connectors * nipples * unions and flanges. * Learners to be shown how to use a range of techniques for jointing pipework. * Learners to practice their pipework fabrication skills using a range of jointing methods and materials. |
| * 1. Components | * Learners to know how to fit, fix and connect the following appliances, components and accessories.   Appliances:   * baths * WCs * wash hand basins * sinks * boiler (connections)   Components:   * mixer taps * pillar and bib taps * stop valves * servicing valves * full-way gate valves * spherical plug valves * drain valves * float-operated valves (part 1–4) * radiators * radiator valves * gutter components * hot water cylinders * showers * hot water heaters. * Learners to be shown how to complete the installation of appliances and components. * Learners to practice the installation of a range of plumbing and heating appliances and components with reference to manufacturers’ instructions. |
| **Inspect and pre-commission** | | |
| 1. Confirm appliances, components and accessories installed are:  * of the right type and size * fit for purpose in accordance with the plumbing and heating system’s design * suitable for the working environment in which they are installed |  | * Learners to know the steps taken during inspection and pre-commission activities to confirm the appliances and components are fit for purpose in accordance with the plumbing and heating system’s design, that they are suitable for the work environment and that they are of the right size and type. Checks include: * that all joints have been made correctly * that all pipework is secure * that the installation conforms to the regulations * that the pipe size and gradient (sanitary) are fit for purpose. * Learners to be shown how to complete inspection and pre-commissioning activities. * Learners to work together to complete inspections. |
| 1. Determine that the appliances, components and accessories have been fitted in accordance with:  * the plumbing and heating system’s design * the working environment * manufacturer instructions | * 1. Preparatory work | * Learners to know the steps taken during inspection and pre-commission activities to confirm the appliances and components have been fitted in accordance with the plumbing and heating design and manufacturers’ instructions. * Check that appliances have been installed to the correct height. * Check that appliances and components are secure and level. * Check that service valves have been fitted as required. * Check that drain-off valves have been fitted. * Check that safety devices have been fitted. * Check that the installation conforms to the regulations. * Check that the installation conforms to the installation section of the manufacturers’ instructions. * Learners to be shown how to complete the various steps of the process and to then complete a simulated activity independently. |
| 1. Inspect and pre-commission appliances, components and accessories in accordance with:  * the plumbing and heating system’s design * manufacturer instructions |  | * Learners to know the steps taken during pre-commission activities to confirm the appliances and components have been installed in accordance with the plumbing and heating system’s design and manufacturers’ instructions and is ready to be soundness tested. * Check that all joints have been made correctly. * Check that all pipework is secure. * Check the installation conforms to the regulations. * Check appliances are fitted correctly. * Check appliance dimensions meet the plans. * Check the installation of components. * Check flow rates. * Check pressures. * Check temperatures. * Learners to be shown how to complete the process through demonstrations. * Learners to inspect and pre-commission a range of appliances, components and accessories. |
| 1. Confirm the integrity of the installed system using appropriate testing procedures |  | * Learners to know the correct method and to practice how to carry out a soundness test in line with current industry requirements on installed systems and components, including: * visual inspection * notifying occupants * initial fill * stabilisation * testing to required pressure * checking for leaks * checking pressures after test period * completing documentation and notifying as required. * Learners to carry out soundness testing on a range of plumbing and heating systems using air tests and hydraulic pressure tests. |