Unit 207PH: Understand cold water systems

# Delivery guide

Unit information

The purpose of this unit is for learners to explore cold water systems within a domestic property and industrial and commercial building and the knowledge that underpin work on the different systems. Learners will have the opportunity to install and test cold water systems.

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

* How do you get a cold water supply to a domestic property?
* Why are there different types of cold water systems?
* How do you install a cistern, bath, wash hand basin or toilet to cold water supply?
* How do you test a cold water system?

Learning outcomes

1. Understand the applications, advantages and limitations of cold water systems
2. Understand the applications, advantages and limitations of appliances, components and accessories in relation to the working environment
3. Understand the methods and techniques for fitting, fixing and connecting the selected appliances, components and accessories
4. Understand the appropriate testing procedures for confirming the systems' integrity

Suggested resources

British Standards

* BS EN 806 *Specification for installations inside buildings conveying water for human consumption (Parts 1*–*5).*
* Manufacturers’ instructions.

Suggested resources (continued)

Websites

* [GOV.UK | Building regulations 2010 | A](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/429060/BR_PDF_AD_A_2013.pdf)
* [GOV.UK | Building regulations 2010 | G](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/504207/BR_PDF_AD_G_2015_with_2016_amendments.pdf)
* [Water Regs UK | Home](https://www.waterregsuk.co.uk/)
* [Planning Portal | Home](https://www.planningportal.co.uk/)
* [HSE | Home](https://www.hse.gov.uk/)
* [Safety Sign UK | Home](https://www.safetysignuk.co.uk/)

Suppliers’ websites

* [Grohe | Home](https://www.grohe.co.uk/en_gb/)
* [Pegler | Home](https://www.pegleryorkshire.co.uk/)
* [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)

Textbooks

* Young, L. & Mays, G. (2000) *Water Regulations Guide*. 2nd edition. Gwent: Water Regulations Advisory Scheme (WRAS). ISBN 978-0-95397-080-3
* 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** |
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| 1. Understand the applications, advantages and limitations of cold water systems | * 1. The two main types of water supply to dwellings and how these are regulated | * Learners to be able to describe the two main types of water supply to dwellings: * mains water supplies * private water supplies. * Learners to be aware of the contents of the Private Water Supply Regulations and the Water Supply (Water Fittings) Regulations: * Private water supplies are inspected by the local authority. * Mains water supplies are inspected by the water undertaker. * Learners to recap the key points and to be able to state the features of each type of system. |
| * 1. Thefluid categories of water and uses of water supplied to dwellings | * Learners to be able to identify the five fluid categories and provide examples of each category: * fluid category 1: wholesome water supplied by the undertaker * fluid category 2: water in FC1 whose aesthetic quality is impaired due to a change in colour, odour or temperature * fluid category 3: fluid that represents a slight health hazard * fluid category 4: fluid that represents a significant health hazard * fluid category 5: fluid that represents a serious health hazard. |
| * 1. The mains water treatment process and typical mains water distribution system from treatment works to property | * Learners to be able to describe the mains water treatment process and typical mains water distribution system from treatment works to property, including: * filtered * ionized * chlorinated * ultraviolet (UV) treatment * aeration. * Learners to be able to identify key elements of the water distribution system, including: * pumping station * treatment works * trunk main * service main * local mains. * Learners to be aware of typical pipework sizes and pipework materials used for the distribution network. Learners to carry out exercises where they are given diagrams of a distribution network and to identify the key elements, including descriptions of their functions. |
| * 1. The mains water service to the property and isolation points | * Learners to be able to describe the mains water service to the property and isolation points including: * connection methods to the main * communication pipe detail * service pipe detail * main external stop valve location and meter housings * installation requirements * methods of entry of the service pipework to a property. * Learners to be able to identify the different types of water meter installations including underground, external to the building, internal within the building. * Learners to be given diagrams and drawings to label and identify isolation points, etc. * Learners to be able to describe the methods of operation of key isolation valves such as supply stop taps and the property stop tap. |
| * 1. The requirements to provide water whilst preventing waste, undue consumption, misuse or contamination | * Learners to be able to describe the legal requirements to provide water whilst preventing waste, undue consumption, misuse or contamination as laid down in the Water Regulations. * Learners to be able to describe the key contamination issues in plumbing systems such as cross connection and the use of non-approved materials. * Learners to be able to explain backflow risk and required methods of prevention as laid down in the Water Regulations including basic mechanical and non-mechanical methods. * Air gaps: AA, AB, AD, AG, AUK1, AUK2, AUK3, DC * Mechanical: BA, CA, DB, EA/EB, EC/EDHA, HUK1, HC. * Learners to be shown the effects of not having backflow protection and to be able to state why backflow protection is needed. * Learners to make reference to the negative impact of dead legs in systems including bacteria growth and legionella. |
| * 1. The advantages and disadvantages of cold water systems | * Learners to be able to describe the advantages and disadvantages of direct and indirect cold water systems in relation to: * flow rates * cost * installation requirements * lifespan * supply pressures * suitability for the property * length and colour availability * design requirements. * Learners to recap key points and to be able to state advantages and disadvantages of both types of system. |
| * 1. The types and typical pipe sizes used in cold water systems within dwellings | * Learners to be able to describe the types and typical pipe sizes used in domestic properties: * medium-density Polyethylene (MDPE), R250 Copper, Polybutylene * minimum pipe size for a cold water rising main, diameter 15mm * minimum pipe size for a distribution pipe from a cold water storage cistern, diameter 22mm. * Learners to be able to describe common MDPE pipe sizes (20mm, 25mm). * Learners to be shown actual examples of different types of pipes and to be able to state what they are used for and why. |
| 1. Understand the applications, advantages and limitations of appliances, components and accessories in relation to the working environment | * 1. The working principles of cold water systems, positioning, fixing, connection and operation of components | * Learners to be able to describe the working principles of cold water systems, positioning, fixing, connection and operation of the following components: * sanitary appliances such as baths, basins, sinks, washing machines and dishwashers * taps, outlets and valves such as mixer taps, bib taps, pillar taps, gate valves, float-operated valves, drain valves, servicing valves, full-way gate valves and ceramic disc taps. * Learners to be able to describe the layout and installation requirements for protected plastic storage cisterns. * Learners to be able to explain the requirements for positioning drain valves in cold water plumbing systems. * Learners to be shown the operation of float-operated valves used in cisterns. |
| **Install** | | |
| 1. Understand the methods and techniques for fitting, fixing and connecting the selected appliances, components and accessories in accordance with:  * the plumbing and heating system's design * the working environment * manufacturers' instructions | * 1. How to fill and vent cold water systems | * Learners to know the methods of filling and venting a cold water system. * Open the kitchen cold tap and slowly open the mains cold water stop valve. * Allow the water to flow into the kitchen sink to clear any debris that may have collected in the pipework. * Close the cold tap on the kitchen sink and allow the system to fill to full standing pressure. * Turn on the isolation valves to the float operated valve (FOV) in the WC cisterns and allow the cistern to fill to the water line and adjust the water level as necessary. * Flush the WC and check for leaks. * Fill any cisterns in the roof space and adjust the water level at the FOV as necessary. * Open any taps and terminal fittings fed from the cistern and clear any air in the system. * Allow the water to run to clear any debris. * Learners to be shown examples of filling and venting cold water systems in a variety of settings such as domestic and commercial buildings. Learners to be shown actual examples of systems being filled and vented. |
| * 1. The insulation requirements, system frost protection and prevention of undue warming of cold water systems | * Learners to be able to explain the reasons for insulating cold water systems pipework and components to provide frost protection and prevent undue warming, based on the requirements of the Water Regulations. * Learners to be able to describe insulation types and areas of the building where pipework must be insulated. * Learners to be able to explain the requirements for pipework positioning to prevent undue warming, for example running hot water pipework above the cold water pipework. * Learners to be shown actual examples of the effects of not providing frost protection and to be able to state why they think undue warming should be prevented. |
| * 1. The positioning and fixing of pipework within the building fabric | * Learners to be able to describe the positioning and fixing of pipework within the building fabric in line with current industry requirements and applicable regulations for pipework: * under suspended timber floors * under solid floors * embedded in walls * in areas of the building subject to frost. * Learners to be able to describe how to cater for the weight distribution of cisterns and heavy components within a building. * Learners to know the maximum pipework clipping distances for vertical and horizontal cold water system pipework as laid down in the Water Regulations. * Learners to know the requirements for notching and drilling holes in timber joists, including the maximum depth and permitted zones. * Learners to know the maximum depth of pipe chases in walls. * Learners to carry out exercises to identify and describe how pipework would be installed in different parts of a building by identifying the type of building fabric and then giving reasons for their choice of installation. |
| * 1. How to install cold water systems | * Learners to know how to install the following components in compliance with the manufacturer instructions, industry requirements and current regulations and standards: * cisterns * baths * waste heat boiler (WHB) * WC * copper pipework * plastic pipework. * Learners to be aware of how to connect cold water pipework to components. * Learners to complete exercises and to be shown practical demonstrations where possible. * Learners to be able to identify different types of building fabric and the precautions to be taken when installing pipework and components within them. |
| 1. Understand the appropriate testing procedures for confirming the systems' integrity | * 1. The visual inspection of a cold water system to confirm that it is ready to be soundness tested | * Learners to be able to explain the steps taken during a visual inspection to confirm the cold water system is ready to be soundness tested: * Check that all joints have been made correctly. * Check that all pipework is secure. * Check that the installation conforms to the regulations. * Check that any open ends of pipes have been fitted with cap ends. * Check that any cisterns are supported. * Check that service valves have been fitted correctly. * Check that drain-off valves have been closed off. * Check that tap and tank connections are fully tightened. * Check the inside of any cisterns installed to ensure that they are free of debris. * Learners to be aware that any problems, such as insufficient clipping of pipes and missing or incorrectly installed service valves, should be rectified before testing begins. * Learners be able to state where potential leaks might occur and then to complete a visual inspection of a cold water system. |
| * 1. A soundness test to industry requirements on cold water systems pipework and components | * Learners to be able to describe a soundness test to industry requirements on cold water systems pipework 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 be made aware of the equipment used and the types of test needed for both rigid metal and plastic pipework, including test pressure and test durations. * Learners to be informed of the requirements for flushing a cold water system. * Learners to be shown how to use hydraulic test equipment and to be given the opportunity to use the equipment themselves. * Learners to be able to state which pieces of equipment would be used and why. |