Unit 210PH: Understand rainwater systems

# Delivery guide

Unit information

The purpose of this unit is for learners to explore rainwater systems within a domestic property and industrial and commercial building and the knowledge that underpin work on the different systems.

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

* Why are there different types of rainwater systems?
* What are the limitations of various rainwater systems and components?

Learning outcomes

1. Understand the applications, advantages and limitations of rainwater systems
2. Understand the applications, advantages and limitations of appliances, components and accessories in relation to the working environment

Suggested resources

British Standards

* BS EN 12056-3:2000 *Gravity drainage systems inside buildings. Roof drainage, layout and calculation.*
* BS EN 16941-1:2018 *On-site non-potable water systems. Systems for the use of rainwater*.

Websites

* [Flopast | Home](https://www.floplast.co.uk/)
* [GOV.UK | Building regulations 2010 | H](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/442889/BR_PDF_AD_H_2015.pdf)
* [Guttercrest | Home](https://www.guttercrest.co.uk/)
* [Marley Plumbing and Drainage | Home](https://www.marleyplumbinganddrainage.com/)
* [Planning Portal | Home](https://www.planningportal.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.

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. Understand the applications, advantages and limitations of rainwater systems | * 1. The types and layout features of rainwater systems | * Learners to be able to identify types and layout features of rainwater systems.   Pipe (RWP):   * round section * square section   Gutter:   * half round * square * ogee (ornamental gutter) * high capacity   Layouts:   * pitched roof systems * flat roof systems. * Learners to be shown examples of different layouts that are used for different types of roofs and the various system components and types of pipe and gutter that are used. |
| * 1. The advantages and disadvantages of rainwater systems | * Learners to be able to state advantages and disadvantages of rainwater systems, pipe (RWP) and gutter materials in relation to: * corrosion resistance * flow rates * cost * installation requirements * lifespan * coefficient of linear thermal expansion * weight * suitability * length and colour availability * strength and flexibility. * Learners to be shown how to carry out calculations and other selection processes and to be provided with details of roofs and buildings to decide which type of system layout is most suitable. |
| * 1. The typical sizes and materials used in rainwater systems | * Learners to be able to identify typical sizes and materials used in rainwater systems.   Pipe (RWP):   * round sections * square sections   Gutter:   * half round * square * ogee * high capacity   Materials:   * PVC-U * extruded aluminium * cast iron * specialist materials such as lead lined/copper, fusion welded. * Learners to be shown actual examples of different components and materials and to research the typical sizes and materials that are used for each. |
| 1. Understand the applications, advantages and limitations of appliances, components and accessories in relation to the working environment | * 1. The working principles of rainwater systems, type, positioning, fixing, connection and operation of components | * Learners to be able to describe working principles of rainwater systems, type, positioning, fixing, connection and operation of components: * pipe (RWP) * offsets * angles * branches * hopper heads * shoes * specialist connectors to the drainage system * brackets * gutter * running outlets * gutter angles * gutter unions * stop ends * specialist unions between different gutter materials * fascia brackets * rafter brackets * rise and fall brackets. * Learners to: * state the positioning and fixing requirements of gutter system components * recommend fixing distances and types of screws used * recommend fall * know the running outlet position * know the changes of direction in the gutter run. * Learners to be able to explain the jointing methods for rainwater and gutter systems, including: * PVC-U * extruded aluminium * cast iron * specialist materials such as lead-lined box guttering. * Learners to be able to state which components would be required at different positions in a rainwater system. * Learners to complete exercises to produce lists of components and fixings that are needed based on given drawings of systems. |
| * 1. The expansion and contraction in rainwater systems and negative effects | * Learners to be able to explain expansion and contraction in rainwater systems and describe the negative effects. * Learners to be able to explain how expansion and contraction may be catered for in PVC-U gravity rainwater systems. * Learners to know about the thermal expansion mark on the joint. * Learners to be shown an actual example of an expansion mark and to be able to identify one on another component. * Learners to be able to state what they think the negative effects would be. |
| * 1. The working principles of rainwater recycling systems | * Learners to be able to describe the basic operating principles of rainwater recycling systems. * Learners to be able to identify the permitted uses of captured rainwater in properties, e.g. flushing toilets, washing cars, etc. * Learners to be able to describe the purpose of components used within rainwater harvesting systems: * anti-surcharge valve * calmed inlet * inlet filter * level sensor / float switch * module (including pump and air gap) * pump control unit * system control unit * water level gauge. * Learners to know what the purposes of the key components are and to be able to identify them from images / actual examples. |