Unit 327HV: Understand commissioning of heating and ventilation systems for industrial and commercial buildings

# Delivery guide

Unit information

This unit covers the knowledge and understanding of the procedures involved in commissioning cold water, hot water, hydronic heating and chilled water systems.

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

* What are the methods and techniques used for commissioning heating and ventilation systems in industrial and commercial buildings?
* What documentation is used to record the performance of the system?

Learning outcomes

1. Understand the methods for confirming that the equipment, components and accessories installed are suitable and fit for purpose
2. Understand the methods and techniques for commissioning the systems and their associated equipment, components and accessories

Suggested resources

Textbooks

* BESA TR/20 (2003) *Technical Specification for Pipework Installation.* London: The Building Engineering Services Association.
* Bleicher, D. (2017) *BSRIA Illustrated Guide to Mechanical Building Services (BG/31/2017)*. Berkshire: BSRIA.   
  ISBN 978-0-8602-2758-8
* Chadderton, D. (2012) *Building Services Engineering*. London: Taylor & Francis. ISBN 978-0-4156-9932-7
* HSE Legionnaires’ disease. The control of legionella bacteria in water systems. Approved Code of Practice and Guidance 2013 (L8). IBSN 978-0-7176-6615-7
* Oughton, D., Hodkinson, S. and Brailsford, R. M. (2015) *Faber and Kell’s Heating and Air-Conditioning of Buildings.* London: Routledge. ISBN 987-0-4155-2265-6
* Parsloe, C. (2010) *BSRIA Commissioning Water Systems* *(BG 2/2010)* Berkshire: BSRIA. ISBN 978-0-8602-2689-5
* Parsloe, C. (2010) *CIBSE Commissioning Code W: Water Distribution Systems (CCW).* Berkshire: BSRIA.

ISBN 978-1-9068-4615-2

* Ronceray, M. and Parsloe, C. (2021) *Pre-Commission Cleaning of Pipework Systems*. Berkshire: BSRIA.

ISBN 978-0-8602-2784-7

* Young, L. and Graham, M. (2000) *Water Regulations Guide*. *Water Regulations Advisory Scheme*. Stockport: WRAS.

ISBN 978-0-9539-7080-3

Websites

* [Fernox | Homepage](http://www.fernox.com/)
* [Sentinel Protects | Homepage](http://www.sentinelprotects.co.uk/)
* [The Engineering Mindset | Homepage](http://www.engineeringmindset.com)
* [VEXO | Homepage](http://www.vexoint.com/)

Legislation

* [GOV.UK | The Water Supply (Water Fittings) Regulations 1999](https://www.legislation.gov.uk/uksi/1999/1148/contents/made)
* *Building Regulations 2010 Approved Document L2A: Conservation of fuel and power in new buildings other than dwellings. 2013 edition with 2016 amendments.* Newcastle upon Tyne: NBS.

ISBN 978-1-8594-6745-9

| **Learning outcomes** | **Criteria** | **Delivery guidance** |
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| 1. Understand the methods for confirming that the equipment, components and accessories installed are suitable and fit for purpose | * 1. The appropriate industry standards and regulations relevant to inspecting, pre-commissioning and commissioning systems | * Learners to know the documents, regulations and standards relevant to pre-commissioning and commissioning of: * cold water systems * hot water systems * hydronic heating systems * chilled water systems. * Learners to know the information contained within these documents and to have access to these throughout the unit for reference including: * BESA TR/20: Installation and testing of pipework systems. Part two – Medium temperature hot water heating * BS EN 806:2012*.* Specification for installations inside buildings conveying water for human consumption (Parts 1–5) * BSRIA Guides * manufacturers’ instructions * Gas Safety Installation and Use Regulations 1998 * Water Supply (Water Fittings) Regulations 1999 * Building Regulations 2010 Approved Document G3: Hot water supply and systems * BESCA Assessment Schedule – TS.5 (May 2018). |
| * 1. The organisational procedures used to confirm that equipment, components and accessories are installed correctly and are fit for purpose | * Learners to be able to explain the processes involved within the installation, from commencement through to handover, to the client and ensure that systems are installed correctly and are fit for purpose. * Learners to understand the process of quality assurance systems and processes on site using role play. * Learners to be given tasks to carry out snagging on recently installed pipework within the workshop and to examine examples of real specifications from projects to highlight the standards required. * Learners to be able to examine drawings and discuss how tasks would be approached and how confusion may occur on site if correct questions regarding the installation are not raised. * Learners to use site meetings within workshop sessions to simulate procedures found on site including: * quality control procedures * specification * snagging lists * installation and as-fitted drawings * schematic diagrams * site meetings. |
| * 1. The checks to confirm that the equipment components and accessories are fitted correctly and ready to be commissioned | * Learners to use practical sessions within the workshop to develop their understanding of checks and inspections of recently installed pipework and components. * Learners to be familiar with inspection activities when tasks are nearing completion and to know how to carry out site meetings and toolbox talks around this subject. * Learners to be given static tests and visual inspection sheets to conduct on their work or peer’s work including: * visual inspection * system design criteria * pre-commission checklists * checking brackets are suitable * checking components are fitted, fixed and connected correctly * specification. |
| 1. Understand the methods and techniques for commissioning the systems and their associated equipment, components and accessories | * 1. The types of test equipment and associated components for use in the commissioning of wet systems | * Learners to know the measuring devices used to commission wet systems and how they can be used within a wet system including: * commissioning sets * manometer * pressure and flow meter * differential meters * weir gauge * pressure gauge * thermometers. * Learners to know the devices fitted within wet systems, which are designed to alter the flow and pressure within a circuit including: * metering stations * binder points * double regulating valves * pressure reducing valves * flow metering devices * orifice plates. * Learners to be able to examine these pieces of equipment and components and to discuss their operation and use within the commissioning process. |
| * 1. The purpose of and basic operation of test equipment and associated components | * Learners to be able to examine test pumps and gauges used to check for tightness of wet systems. * Learners to be shown presentations and videos and to be given manufacturers’ literature to explain their use and how to connect these pieces of test equipment to the relevant systems including: * hydraulic test pump (manual and where possible electronic) * test gauges. |
| * 1. The basic procedures for establishing the performance of installed systems | * Learners to know how adjustment can be made within a system by adjusting components such as double regulating valves and pressure reducing valves within systems in the workshop. * Learners to know how to connect equipment to the system including: * manometers * pressure and flow meters * differential gauges. * Learners to know how to measure system performance using correct equipment including: * measuring flow rates and pressures * taking flow * return temperatures. * Learners to know these procedures for wet systems and to be set basic tasks to make adjustments to these systems including: * cold water systems * hot water systems * hydronic heating systems * chilled water systems. |
| * 1. The basic procedures for adjusting systems performance when they do not meet design requirements | * Learners to know how to measure using basic measuring equipment and how to carry out practical tasks. * Learners to be given further tasks to make adjustments to these systems to establish set points given by the tutor. |
| * 1. The methods for filling and charging the systems and the removal of air | * Learners to know how various systems are charged and filled and should be aware of what valves and components are to be operated to ensure this process is safe and efficient. * Learners to be shown presentations then carry out practical assessments to show how water is added and air is removed from a system. |
| * 1. The procedures for adding water treatment and chemicals for the protection of the system | * Learners to be given copies of the following to refer to: * TR/20 Installation and testing of pipework systems. Part two – Medium temperature hot water heating * Water Supply (Water Fittings) Regulations 1999 * BS EN 806:2012*.* Specification for installations inside buildings conveying water for human consumption (Parts 1–5). * Learners to be shown presentations and manufacturers’ literature to help explain the processes involved in chemical cleaning and disinfection of potable water systems with chlorine. * Learners to look at dosing pots for Low Temperature Hot Water (LTHW) and chilled water systems and to be able to demonstrate their operation. * Learners to know about modern systems and processes and the types of chemicals suited to different systems from visiting chemical treatment specialists and manufacturers where possible. |
| * 1. The procedures for recording the performance of commissioned systems | * Learners to be able to list relevant people, customers and clients who need to be involved during a commissioning and handover process. * Learners to be given typical commissioning documentation and to examine the information it contains. * Learners to be able to explain what role of an Operation and Maintenance (O&M) manual is and the documents typically contained within it. * Learners to be able to explain the need for water quality checks on wet systems and when they would be conducted, along with biocide tests. |